RADIUM HOT SPRINGS WINDOWS AND DOORS IMPROVEMENTS

Project Number: FII 705

PROJECT SPECIFICATIONS

Prepared for Parks Canada Agency by

COVER Architectural Collaborative Inc.

SUBMISSION
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Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises Radium Hot Springs Windows and Doors Improvements.

1.2 WORK OF THIS CONTRACT

.1 Work of this Contract comprises multidisciplinary rehabilitation of the Radium Hot Springs Facility adjacent to the town of Radium, British Columbia. The project includes, but is not limited to:

.1 Architectural rehabilitation including but not limited to:

.1 Window replacement.

.2 Removal and reconstruction of a portion of existing rundle stone wall and steel angle iron on noted window heads.

.3 Reconstruction of portions of heritage wall assemblies from deterioration, cut stone window sills and other architectural features.

.4 Refurbishment of existing original aluminum doors.

.5 Refurbishment of existing doors, including new hardware, new threshold and weather stripping.

.6 Glazing unit replacement in existing, retained frame.

.2 Electrical work to support Architectural Scope, including but not limited to:

.1 Barrier-free operator supply and installation in new and existing doors.

.2 Electrical routing to support Barrier-free operator supply.

.3 Phased construction, to accommodate limited interruption to the services of the building and the existing facility.

.4 Undertake window replacement where not more than one opening is tarped or left incomplete at a time.

.5 Supply and installation of complete systems, fully functional, tested, and commissioned in accordance with specification.

.6 Supply of turnover documentation including shop drawings, warranty documents, operation and maintenance binders in accordance with specification.

.7 Provide training for all systems to the department's representative and supporting facility operators.

1.3 DURATION OF WORK

.1 Work of this Contract is anticipated to have a completion timeline of 4 months after award of work.

1.4 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

1.5 WORK SEQUENCE

.1 Construct Work in stages to accommodate continued use of site and premises during construction for staff and visitors.

.2 Co-ordinate Progress Schedule and co-ordinate Occupancy during

construction.

.3 Maintain fire access/control.

.4 Required construction phases: Phased construction is required to accommodate limited interruption permitted to the main road servicing the site and car parking facilities, and one opening left open at once.

.5 Co-ordinate with articles 'Contractor Use of Premises', 'Progress Schedule', and with Drawings.

.6 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.

1.6 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for work, for storage, and for access, use of premises, to allow:

.1 Occupancy.

.2 Public usage.

.2 Co-ordinate use of premises such as work areas, storage, delivery of materials and equipment, parking, washroom facilities provision and use, elevator, power and water use shall be coordinated.

.3 Delivery of materials to be scheduled with Departmental Representative at minimum of 24 hours in advance.

.4 Contractor shall supply all necessary signage, hoarding and fencing.

.5 Contractor is responsible for all dust control measures. Contractor shall maintain the work areas under negative pressure to minimize potential for dust spread in the building.

.6 Contractor shall coordinate all work during normal hours of operation. Coordinate all deliveries to minimize the disruption to the normal operation of the facility.

.7 All work to be performed after hours shall be coordinated with Departmental Representative 72 hours in advance.

.8 Work to be completed in staff only areas shall not be completed after hours due to security restrictions.

.9 A temporary storage area for salvaged Historic Windows is to be located in a designated storage area in the basement. Contractor shall supply all hoarding and fencing. Laydown area to be back of parking lot across the road.

.10 Contractor shall abide by all on-site security provisions and regulations.

.11 Contractor to protect areas adjacent to work area. Contractor responsible for any damage of owner property.

1.7 OCCUPANCY

.1 The establishment will be occupied during entire construction period for execution of normal operations by both staff and public.

.2 Co-operate in scheduling operations to minimize conflict and to facilitate usage of the establishment.

1.8 CONTRACTOR FURNISHED ITEMS

.1 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples, and other submittals. Submit any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Handle products at site, including uncrating and storage.

.5 Protect products from damage and from exposure to elements.

.6 Assemble, install, connect, adjust, and finish products.

.7 Provide installation inspections required by local authorities. Provide notice to Department Representative 72 hours in advance.

.8 Repair or replace and make good items damaged by contractor on site during construction.

.9 The word "make good" used in the contract documents means "to restore new or existing work after being damaged, cut, patched or rejected" and also means "using materials identical to the original materials with visible surfaces matching the appearance of the original surfaces in all details and with no apparent junctions between new and original surfaces. Where original materials are no longer available, the Contractor may submit a proposal of materials for review." Departmental Representative to determine is work is acceptable. Contractor to correct work until Departmental Representative is satisfied. Contractor to advise Department Representative immediately if work causes further damage to historic elements.

1.8 MOCK-UPS

.1 Refer to individual Specification Sections for required mock-ups.

1.9 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

.2 Radium Hot Springs Aquacourt is a Classified Federal Heritage Buildings Review Office (FHBRO) building and as such FHBRO review processes are in place.

.3 Significant damages to existing building fabric especially of Character Defining Elements (CDEs) may cause schedule delays as approvals of repairs must be obtained before repair work can be carried-out.

.4 Repair methods and materials to CDEs to be at Contractors' cost and that these must be approved by Consultant and FHBRO. Submit repair procedures to DR prior to commencing work.

.5 Work must conform to the Standards and Guidelines for the Conservation of Historic Places in Canada, Edition 2 (http://www.historicplaces.ca/en/pages/standards-normes.aspx), including, but not limited to, the following:

.1 Patching materials must be in kind.

.2 Minimal intervention must be employed.

.3 Depending on conditions, new materials must be distinguishable, compatible and reversible. All materials must be submitted and only executed upon Departmental Representative approval.

.6 Refer to Heritage Character Statement, attached to this Section.

1.10 CONSTRUCTION PERIOD

All work shall be completed by October 1, 2021.

1.11 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings, up to date with markups from RFIs, Cos, SIs, etc.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

1.12 UNIT RATES

.1 Provide unit rates for the following scopes of work, submit for review to Departmental Representative in conjunction with submission of tender documents

.1 Drywall Repair, work result conforming to section 09 21 16.08 Gypsum Board Assemblies for Minor Works
.2 Gypsum Plastering, work result conforming to section 09 23 00 Gypsum Plastering
.3 Heritage Masonry, work result conforming to section 04 03 43.19 Period Stone Dismantling, section 04 05 00 Common Work Results for Masonry and section 04 05 13 Masonry Mortaring and Grouting.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 ATTACHMENTS

.1 Heritage Character Statement.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with the establishment to facilitate work as stated.

.2 Maintain existing services to building(s) and provide for personnel and vehicle access.

.3 Sanitary facilities will be assigned for use by Contractor's personnel. Keep facilities clean.

.4 Closures: protect work temporarily until permanent enclosures are completed.

.5 Keep all hallways, lobbies, etc. open for public and staff use at all times. Spa area is only area that will not be open. Work that impairs hallway, lobby, etc. access is to be coordinated one week in advance with Department Representative.

1.3 EXISTING SERVICES

.1 If interruption of services is inevitable, obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give 48 hours of notice to Departmental Representative for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum.

.3 Provide alternative routes for personnel, pedestrian, and vehicular traffic as required.

.4 Establish location and extent of service lines in area of work before starting Work. Notify any findings.

.5 Submit schedule to and obtain approval for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.6 Provide temporary services when directed to maintain critical building and tenant systems.

.7 Where unknown services are encountered, immediately advise Department Representative and confirm findings in writing.

.8 Protect, relocate or maintain existing active services. Advise Departmental Representative prior to action. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction. Document and specify location on as built documents.

.9 Record locations of maintained, re-routed and abandoned service lines.

.10 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 SPECIAL REQUIREMENTS

.1 Paint public or staff occupied areas Monday to Friday from 23:00 to 06:00 hours only, all after hours work shall require approval from Department Representative.

.2 Carry out noise generating Work (such as drilling and coring or similar noise generating work) Monday to Friday from 23:00 to 06:00 hours.

.3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.4 Keep within limits of work and avenues of ingress and egress.

.5 Ingress and egress of Contractor vehicles at site is limited to 6. Contractor to park across the road except for deliveries.

.6 Coordinate material delivery with Departmental Representative 24 hours in advance.

1.5 HERITAGE PROJECT REQUIREMENTS

.1 Refer to Section 01 11 00 – Summary of Work, Article 1.9.

1.6 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCE STANDARDS

.1 General Conditions.

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1.02 PRIME COST SUM

.1 Included in Contract Price a total Prime Cost Sum of:

.1 $20,000.00

.2 Do not include in the Contract Price, additional contingency allowances for products, installation, overhead or profit.

.3 No interpretation of the items listed under Prime Cost Sum Allowances shall indicate that work will be included under the Prime Cost Sum. Items, tasks and activities included in the Works elsewhere in the contract shall be paid as indicated in those sections and not under the Prime Cost Sum.

.4 Any and all work under the Prime Cost Sum must be approved by the Departmental Representative prior to commencement.All expenditures must be substantiated with verified invoices and/or accepted daily work reports as noted in Measurement and Payment Procedures below.

.5 Such work may include but not limited to:

.1 Degradation of wood framing requiring remediation work
.2 Steel headers and steel fasteners that may be rusting, requiring replacement.
.3 Spalling concrete requiring remediation work.
.4 Mold growth requiring remediation work.
.5 Water ingress requiring remediation work.
.6 Excessive moisture issues requiring remediation work.
.7 Saturated insulation requiring replacement.

1.03 MEASUREMENT AND PAYMENT PROCEDURES

.1 Payment for Work under Prime Cost Sum shall be made using negoteiated rates or by material, labour and equipment rates as per the following:

.1 Hourly rental of equipment shall be measured in actual working time and necessary travel time within project limits. Transportation time to and from site to be reimbursed only if equipment is used exclusively for additional work.

.2 When based upon actual costs for additional works under Prime Cost Sum, payment shall be based upon supplied invoices and other work recrods.

.3 The Prime Contractor may apply a 10% mark-up to subcontractor or supplier invoices only and as accepted by the Departmental Representative. No mark-up will be allowed on relevant equipment and labour rates.

.4 A claim for additional payment will be considered submitted when all required documentation has been received byt he Departmental Representative.

.5 The Departmental Representative's, or their delegate's, signature on extra work reports is only a record of the equipment, materials and labour hours utilized on the task, not an agreement to entitlement or quantification of that Work. Review and acceptance may be based on Contractor submitted finalized extra work reports, which are to include appropriate rates, quantities and applicable invoices. Labour and equipment rates are to be reviewed by the Departmental Representative against the appropriate accepted rates when submitted for payment.

.6 The contractor shall submit extra work reports to the Departmental Representative within 24 hours of the day of extra work.

.7 Unless otherwise provided for in the Contract, payment on a time and materials basis represents complete payment (exclusive of GST) and reimbursement for all impacts, related costs andexpenses, including, without limitation: time;labour; materials; equipment; mobilization; subcontracting; overhead; profit;general supervision; occupational tax and any other Federal or Provincial revenue legislation exclusive of GST; premiums for public liability and property damage insurance policies; bonding; for the use of all tools and equipment for which no specific rental payment provision exists; and for all costs incurred by the Contractor in supplying materials.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

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, BUT GENERALLY ON A WEEKLY BASIS.

.2 Contractor will

.1 Prepare agenda for meetings.

.2 Distribute written notice of each meeting four days in advance of meeting date to Consultant.

.3 Preside at meetings.

.4 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.5 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants affected parties not in attendance.

.3 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRE-DEMOLITION WALK-THROUGH

1. Within 7 days after award of Contract, request a meeting of parties on site to ascertain and confirm existing conditions.

2. Confirm extent of demolition and strategize procedures and methods for the disruption or demolition of heritage elements.

3. Confirm individual variation on-site for repair of windows, doors, and other elements.

1.3 PRE-CONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Owner, Consultant, Contractor, major Subcontractors, field inspectors and supervisors shall be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work.

.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 in accordance with Section 01 52 00 - Construction Facilities.

.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

.8 Contractor's responsibility for errors and omissions in submission is not relieved by reviewed submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by reviewed submittals.

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 As required by 1.3 – Delegated Design Submittals, submit drawings stamped and signed by professional engineer registered or licensed in the Place of the Work.

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

.4 Allow 5 days for review of each submission.

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

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

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

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

.8 Submissions include:

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

.9 Once the review completed, distribute copies.

.10 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as requested.

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

.12 Submit electronic copies of test reports for requirements requested inspecification Sections and as requested.

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

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested inspecification Sections and as requested.

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

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

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested.

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

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested.

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

.17 Submit electronic copy of Operation and Maintenance Data in PDF format for requirements requested in specification Sections and as requested. O&M must be linked to internal contents and searchable. Three hard copies to be provided after review of submittal.

.18 Delete information not applicable to project.

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

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

.21 The review of shop drawings is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 SAMPLES

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

.2 Deliver samples at site meetings or prepaid by courier.

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

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

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

.6 Make changes in samples that may be required, consistent with Contract Documents.

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic digital photography in fine resolution as directed but no less than monthly with progress statement.

.2 Project identification:

.3 Number of viewpoints: Each window and door, before and after the work.

.1 Each window and door, before and after the work.

.4 Frequency of photographic documentation: every two weeks and,

.1 Upon completion of: of Work.

1.6 HERITAGE DEMOLITION & CONSTRUCTION SUBMITTALS

1. Submit demolition plan, procedures and methods, or rehabilitation procedures and methods concerning heritage elements as stipulated in sections below. Documents to be submitted prior to mobilization and commencement of demolition work

   1. Section 02 41 00.08 Demolition Minor Works,
   2. Section 02 41 19 Selective Demolition
   3. Section 04 03 43.19 Period Stone Dismantling.
   4. Section 08 11 16.01 Existing Aluminum Doors and Frames

2. Submittals of new construction as relating to heritage elements to occur in conjunction with demolition documents as stipulated in 1.6.1 (section above), documents to be submitted prior to mobilization and commencement of demolition work. This includes any product data, shop drawings and quality assurance procedures. Submittals must show conformance with heritage construction procedures as shown on drawings and noted in specifications.

   1. Section 09 23 00 Gypsum Plastering
   2. Section 03 30 00 Concrete Grout/Patching
   3. Section 04 05 00 Common Work Results for masonry

   4. Section 04 05 13 Masonry Mortaring and Grouting
   5. Section 08 11 16.02 New Aluminum Doors and Frames
   6. Section 08 50 00 Windows
   7. Section 08 80 00 Glazing
   8. Section 08 71 00 Door Hardware

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.1 Province of British Columbia

.1 Workers Compensation Act, RSBC 1996 - Updated 2018 .

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Contractor to submit 14 days prior to mobilization. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Emergency Response Plan

.4 Practices for removing hazardous materials.

.3 Submit weekly to authority having jurisdiction. Toolbox and safety meetings to Department Representative.

.4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.5 Submit copies of incident and accident reports. Advise Department Representative immediately of any incidents that occur.

.6 Contractor's site-specific Health and Safety Plan will be reviewed and Contractor will be provided with comments within 7 days.

.7 The review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Present Material Safety Data Sheets (MSDS) on site at all times.

1.3 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.4 MEETINGS

.1 Schedule and administer Health and Safety meeting prior to commencement of Work.

1.5 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00- Regulatory Requirements.

1.6 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Consultant and/or Department Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

.3 Comply with W.H.M.I.S. (Workplace Hazardous Material Information System)

1.7 RESPONSIBILITY

.1 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 beaffected by conduct of Work.

.2 Contractor will be responsible and assume the role Constructor as described in the BC Occupational Health and Safety Act and Regulations for Construction Projects.

.3 Contractor shall be the Principal Contractor as described in the BC Act Respecting Health and Safety code for the Construction for only their scope and areas of work as defined and described this project specification.

.4 Comply with and enforce compliance by employees with safety requirements ofContract Documents, applicable federal, provincial, territorial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act, General Safety Regulation, BC Reg. 2018.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Safety Officer and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise verbally and in writing.

1.10 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with Work of this project.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work.

1.11 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Consultant and Department Representative.

1.12 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction.

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

.3 Work may be stopped if non-compliance of health and safety regulations is not corrected.

1.13 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission.

1.14 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment and heritage elements over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 All Contractor operations shall be performed in such a manner that no detritus from his operations shall enter any river, waterway, ditch, or wetland within Kootenay National Park.

.2 If, in the opinion of the Departmental Representative, full containment of Contractor's detritus is not being achieved, operations may be ordered halted until the situation is rectified.

1.2 NATIONAL PARK REGULATIONS

.1 The Contractor shall ensure that all work is performed in accordance with the ordinances, laws, rules and regulations set out in the Canada National Parks Act and Regulations.

.2 The Contractor and any sub-Contractors shall obtain a business license from the Parks Canada Administration Office prior to commencement of the contract.

.3 All Contractor's business and private vehicles are required to obtain a vehicle work pass from Parks Canada. These permits must be obtained from the PCA Administration Office.

1.3 ACTION AND INFORMATION 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 erosion control materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

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

.6 Environmental Protection Plan shall include and address the following which is included in the Appendices:

.1 Preapproved Routine Impact Assessment Frontcountry Areas

.2 Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure

.3 Parks Canada National Best Management Practices for Migratory Birds

.4 National Best Management Practices for Management of Bat Maternity Roosts in Built Assets

.5 Guidelines for Inspection of Trees and Built Assets for Bats

.6 PCA Standards for managing bats in Protected Heritage Places

.7 Guidance on the Management and Protection of Barn Swallow Nests in Parks Canada Places

1.4 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

.1 Execution of the Work is subject to the provisions within the Canadian Environmental Assessment Act (CEAA) 2012 and subsequent amendments.

.2 The Contractor is required to prepare an Environmental Protection Plan (EPP), which shall Include all topics stated in this section.

.3 Failure to comply with or observe environmental protection measures as identified in these specifications may result in the Work being suspended pending rectification of the problems.

.4 The Contractor shall notify the Departmental Representative in a timely manner of any actual or potential environmental incidents or failure of protection measures.

.5 The Contractor shall notify the Departmental Representative immediately of any violations of environmental approvals, permits, authorizations or EPP measures.

1.5 RELICS AND ANTIQUITIES

.1 Give immediate notice to Departmental Representative if evidence of archaeological finds are encountered during construction, and wait for written instructions before proceeding with Work in the area.

.2 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on the site shall remain the property of Parks Canada. Protect such articles and request directives from Departmental Representative.

.3 No anchors shall be used on the natural rock face, rather all anchors and impacts should be restricted to the Aquacourt building itself to avoid any impacts to these rock walls.

1.6 WILDLIFE

.1 Wildlife will be prevented from obtaining food, garbage or other domestic wastes by the Contractor and contract staff. Wildlife attractants will be stored away from animal access
and will not be stored at the work site overnight, unless in approved wildlife container.
Existing Parks Canada waste receptacles will not be used for disposal of such wastes
without prior arrangement with PCA. Incidents involving wildlife accessing garbage or attractants will be reported immediately to the ESO or Resource Conservation staff.

.2 Wildlife encountered at or near Project locations will be allowed to passively disperse without undue harassment.

.3 Parks Canada will be notified in the event of human-wildlife interactions, activity or encounters and any species at risk, dens and/or nests.

.4 Pets are not allowed on the work site, or in any administrative or laydown areas.

1.7 FIRE PROTECTION AND CONTROL

.1 A fire extinguisher shall be carried and available for use on each machine in the event of fire (e.g. ignited by a spark) to prevent the fire from burning the unit or spreading to other fuels in the work area. Basic firefighting equipment – e.g., three (3) shovels, two (2) pulaskis, and two (2) 20 litres backpack pumps shall be maintained at the construction site at a location known and easily accessible to all the Contractor's staff.

.2 Machinery and equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.

.3 No smoking is allowed on the construction site to ensure that accidental ignition of any flammable material is prevented. Fires or burning of waste materials are not permitted.

.4 The Contractor shall maintain an awareness of the fire danger rating (Index) in the work area. Fire prevention care is to be commensurate with the Fire Index.

.5 In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The Departmental Representative shall be notified of any fire immediately.

.6 Deliberately lighting of fires or burning of waste materials is strictly not permitted.

1.8 SITE ACCESS AND PARKING

.1 A plan detailing access to the construction site shall be prepared by the Contractor and included in the EPP. This includes access and facilities at the work sites and within the work limits, including day-to-day entry/egress and plans for delivery and approach for large dimension materials shall be anticipated and described. The access plan shall describe worker transportation to and from the construction site, and parking of workers' private vehicles.

.2 Do not park vehicles in areas beyond work limits, unless specifically authorized by the Departmental Representative.

.3 A construction office may be located at the site area, actual location subject to the approval of the Departmental Representative.

1.9 EROSION AND SEDIMENT CONTROL (ESC) PLAN

.1 The Contractor must prepare an ESC plan for the project to be included in the Environmental Protection Plan. The plan must detail temporary and permanent environmental control measures that the Contractor shall undertake to comply with all applicable legislation, regulations and approvals during the course of their construction. The plan should address the following items:

.1 Pre-Construction Actions:

.1 Prepare and submit for review by Departmental Representative the "Environmental Protection Plan"

.2 Construction Considerations:

.1 Clearing and excavation must start only after installing the sediment and runoff measures as per the plan which has been reviewed and accepted by the Departmental Representative. Only areas required for immediate construction activity and as approved by the Departmental Representative may be cleared. Additional control measures must be installed as excavation advances.

.2 Stockpiles can be located anywhere in the construction work areas approved by Departmental Representative. They must be stabilized

against erosion immediately following stockpiling operations. Runoff from the stockpile areas must be contained to prevent contamination of drainage systems.

.3 Sediment and debris must be prevented from reaching waterways.

.4 Dust control measures must be implemented to prevent wind transport of dust from disturbed soil surfaces.

.5 On-going inspection and maintenance of Erosion and Sediment Controls must be performed by the Contractor until restoration is achieved.

.2 Prior to directing stored water off site, obtain approval from Departmental Representative and ESO.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.10 PLANT PROTECTION

.1 Vegetation:

.1 Protect trees and plants on site.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 If any nest or dens are discovered during work, the area must be flagged and work temporarily ceased until Departmental Representative has taken appropriate action.

.5 All works shall be undertaken in a manner that prevents the introduction or minimizes the spread of invasive alien species and noxious weeds.

1.11 POLLUTION CONTROL

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

.2 Control emissions from equipment in accordance with local authorities' emission requirements.

.3 Spills or releases of hazardous materials or deleterious substances that may cause damage to the environment or human health shall be immediately reported to Departmental Representative and, if required, to the Provincial authority.

.4 The Contractor shall take all reasonable measures to contain all spills. The Contractor shall contain, collect and dispose of spilled products at their expense.

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

.6 All equipment must be properly maintained, in sound mechanical condition and free of any fuel, oil, and hydraulic fluid or coolant leaks.

.7 Equipment must be free of external grease, loose dirt or oil and the machinery must be pressure washed prior to the start of the project.

.8 All machinery must be equipped with emergency spill kits large enough to contain 110% of any possible spills or leaks of oil, fuel, hydraulic fluid or coolant during the project.

.9 The operators of the equipment must be familiar with how to properly use the spill kits in the event of an emergency.

.10 Fuel, oils, lubricants, chemicals, and any potentially hazardous material must not be dispelled into the environment.

.11 Machinery and vehicles must keep to roads, trails, or designated temporary workspaces and turnaround points. The Departmental Representative shall identify approved off-workspaces.

.12 Rutting and/or compaction of ground surfaces should be avoided as much as possible by keeping to designated work areas and away from wet locations.

.13 All areas with rutting damage or noticeable compaction from heavy equipment must be re-graded and back-filled if necessary.

.14 Any holes or depressions caused by site preparation or construction shall be back-filled and compacted to an appropriate degree.

1.12 CONTRACTOR'S OPERATIONS

.1 Confine all operations to the work areas shown on the drawings and designated by the Departmental Representative. No activities of any kind may be carried out beyond those work areas without the written permission of the Departmental Representative.

.2 Do not store or stockpile construction materials in the trees bordering or being preserved on site. Do not unreasonably encumber the site with products.

.3 Provide sufficient sanitary facilities and maintain in a clean condition.

.4 When in the opinion of the Departmental Representative, negligence on the part of the Contractor results in damage or destruction of vegetation, or other environmental or aesthetic features beyond the staked or designated work area, the Contractor shall be responsible, at his expense, for complete restoration including the replacement of trees, shrubs, topsoil, grass, etc. to the satisfaction of the Departmental Representative.

.5 Failure to comply with or observe environmental protection requirements as identified in these specifications may result in work being suspended pending rectification of the problems and operators of equipment being charged under the National Park Act.

1.13 START- UP AND ENVIRONMENTAL BRIEFING

.1 All staff employed at the construction site shall attend an orientation conducted by the Contractor regarding their individual and collective responsibilities, to ensure avoidable adverse environmental impact does not arise from their activities and personal choices. Employees must attend this briefing before beginning their work at the site. Employees of other service and materials providers who attend at the site – e.g., concrete truck operators, crane operators, and truck drivers must be apprised of their duty not to cause adverse environmental impact.

.2 Parks Canada shall have an ESO attending the site to monitor the construction activity for conformance with the EPP. The ESO or alternate designated Parks Canada staff member shall present the "environmental briefing". The ESO's main duties are to monitor the progress of the construction on an on-going basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental Representative, in the event of unanticipated environmental problems. Although the ESO has authority to enforce National Parks Act violations, direction to the Contractor shall be the duty of the Departmental Representative.

1.14 HAZARDOUS PRODUCTS AND MATERIALS

.1 A list of products and materials to be used or brought to the construction site that are considered or defined as hazardous to the environment shall be presented in the EPP. Such products include, but are not limited to; grout, fuel, concrete finishing agents, paint, etc. A plan detailing the containment and storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the application of these products shall be presented in the EPP.

.2 Hazardous products shall be stored no closer than 100 m from any waterway.

.3 MSDS sheets for hazardous material are to be provided in a location accessible to all workers.

1.15 EQUIPMENT FUELLING AND MAINTENANCE

.1 A fuel delivery, storage and distribution plan shall be submitted. Topics to be addressed in the EPP shall include, but not necessarily be limited to:

.1 Diesel and gasoline supply vehicles, including bulk tankers shall be parked more than 100 m from rivers.

.2 Fuel tanks with manual or electric pump delivery systems shall be used, gravity feed is not allowed.

.3 Fuelling personnel shall maintain immediate attention to and presence at the fuelling operation.

.4 Fuelling sites shall be identified by the Contractor in the EPP.

.5 Lubricant changes and minor repairs shall be conducted at a location identified by the Contractor in consultation with the ESO. Waste lubricants, used filters and other waste maintenance products shall be removed from Banff National Park to recycling or certified disposal sites.

.6 Equipment shall be inspected daily for fluid/fuel leaks and maintained in good working order.

.7 Equipment to be used on the project site shall be thoroughly cleaned of soil, seeds and any debris or external contaminants outside the national park before delivery to the work site.

1.16 WASTE MATERIAL STORAGE AND REMOVAL

.1 The Contractor shall prepare a Construction and Waste management plan as a part of the EPP. The Plan shall include the following basic principle:

.1 Waste reduction which follows the 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.2 Wastes generated at the construction site are to be contained and removed in a timely and approved manner. The EPP shall detail the waste management procedures, including the following:

.1 Describe the management of waste.

.2 Construction wastes shall be stored in containers at an approved location and removed promptly when the containers are 90% full.

.3 A concerted effort to reduce, reuse and recycle materials is expected.

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

.5 Provide containers to deposit recyclable materials.

.6 Transport all recyclable materials to an approved recycling facility offsite.

.7 Waste materials are to be disposed at a certified construction waste landfill outside Banff National Park. No burying, burning or discarding of waste materials shall be permitted at the construction site, or elsewhere in Banff National Parks.

.8 No materials attractive to wildlife are to be stored at the site overnight – daily removal is mandatory. Human food products are to be contained in a manner so as not to attract animals, disposed of in bear proof containers, and waste food stuffs are to be removed from the construction site every day.

.9 Portable container toilets are to be provided in sufficient numbers and locations to ensure convenient usage including frequency of pump out.

.3 All garbage must be stored and handled in conformance with the National Parks' Garbage Regulations.

.4 No food, domestic garbage or hazardous wastes may be deposited in the trade waste site.

.5 Dispose of all hazardous wastes in conformance with the Environmental Contaminates Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.

.6 Provide bear proof garbage containers on-site for domestic garbage generated on-site by Contractor's personnel and make arrangement for collection and disposal on a daily basis or when directed by the Departmental Representative.

.7 Maintain the site in a tidy condition, free from the accumulation of waste products, debris and litter.

.8 Do not dispose of or allow dispersing waste or volatile materials such as mineral spirits, oil or paint thinners or other hazardous wastes into waterways. Provide clean- up equipment and adequate supply of absorbent material on-site.

1.17 CONCRETE MANAGEMENT

.1 Wet and uncured concrete is an acutely toxic substance for an aquatic environment. Extra care not to introduce these materials into the environment is required. The Contractor is to prepare an EPP which addresses concrete batch plant location, operation, and reclamation where required, to the satisfaction of the Departmental Representative. This plan shall include the following concrete management elements:

.1 During saw-cutting, only pure water may be used as a cooling fluid. If possible this fluid should be contained, collected and disposed of at an approved location.

.2 Concrete mixer washout shall be contained in a buried or above ground tank,
with wash products moved back to the concrete batching yard or an approved facility for disposal.

.3 Water contaminated in the mixing, placement, and curing of concrete shall be contained and removed from the site to an approved disposal facility.

.4 If a concrete batching plant is used it shall be operated pursuant to applicable dust, air emission, and water quality control regulations.

1.18 NOTIFICATION

.1 Departmental Representative shall notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative shall 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 Products

2.1 NOT USED.

Part 3 Execution

3.1 CLEANING

.1 Leave Work area clean at end of each day as per Division 01.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment from the work site.

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 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 DESIGNATED SUBSTANCES

.1 In the event that any asbestos containing material or any other hazardous material such as moulds, lead or mercury is discovered during the course of carrying out the Work by the Contractor or the Subcontractors, immediately stop work, report the discovery, orally and in writing.

.2 Remove and dispose of the identified hazardous material in accordance with applicable codes and regulations.

.3 Refer to the Hazardous Material Report in Appendix.

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.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSPECTION

.1 Allow 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 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 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 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.

1.3 PROCEDURES

.1 Notify appropriate agency sufficiently in advance of required tests on order that arrangements can be made for attendance by testing agencies.

.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.

1.4 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defectiveproducts or damage and whether incorporated in Work or not, which has been rejected as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents at Contractor's expense.

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

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

1.5 REPORTS

.1 Submit electronic copies of inspection and test reports.

.2 Provide copies to subcontractor of work being inspected or tested.

1.6 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

1.7 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 as specified in specific Section.

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

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

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

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

1.8 MILL TESTS

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary utilities n order to execute work expeditiously.

.2 Remove from site all such work after use.

1.2 USE OF EXISTING UTILITIES

.1 It is the intention of the facility to supply temporary services where specified, however, in the event of any unforeseen occurrence, the facility may discontinue such temporary service, without notice, and without acceptance of any liability, for damage or delay, caused by such withdrawal of temporary services.

.2 Supply of temporary services is subject to the requirements of the facility and level of availability of existing services.

.3 Contractor shall bear costs of all temporary services required for the project, subject to approval by the Departmental Representative, those available from existing services.

1.3 WATER SUPPLY

.1 Water supply is available for use by Contractor.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees C, or as otherwise specified in other Sections of Work, in areas where construction is in progress.

.5 Ventilating:

- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 TEMPORARY POWER AND LIGHT

.1 Maximum power supply of 230 volts 30 amps is available and will be provided for construction use at no cost. Connect to existing power supply in accordance with Canadian Electrical Code and provide meters and switching.

.2 Provide and pay for additional temporary power during construction for temporary lighting and operating of power tools.

.3 Connect to closest available source and keep loose cords at a minimum.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary data hook up, line equipment necessary for own use.

1.7 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.

.2 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

INSTALLATION AND REMOVAL

1.2 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation. Parking and trailers need to be located in the back of the parking across the road from the facility.

.1 Identify areas which have to be gravelled to prevent tracking of mud.

.2 Indicate where scaffolding will be required.

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

.6

SCAFFOLDING

1.3 Scaffolding in accordance with CAN/CSA-S269.2.

.1 Provide and maintain scaffolding.

.2

HOISTING

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

.1 Hoists cranes to be operated by qualified operator.

.2

SITE STORAGE/LOADING

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

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

.2

CONSTRUCTION PARKING

1.6 Limited parking will be permitted on site in designated areas.

.1 Provide and maintain adequate access to project site.

.2

.3 Parking is not permitted on natural or undisturbed areas. Parking will be located at the back end of the parking lot across the road from the facility.

1.7 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays, as required.

.2 Provide fencing and additional security as deemed necessary.

1.8 OFFICES

.1 Provide marked and fully stocked first-aid case in a readily available location.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

1.10 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

.1 No signs or advertisements, other than warning signs, are permitted on site.

.2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.3 Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project.

.4 Permanent company signage on contractor vehicles and trailers is permitted.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

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

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

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

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

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

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

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

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

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

.10 Maintain access for emergency vehicles at all times.

.11 Provide snow removal during period of Work.

1.13 CLEAN-UP

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

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

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

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

.5 Vacuum out all roof drains and locations where debris may have gathered during construction, daily.

.6 In any additional locations specified by the Departmental Representative, as applicable to the scope of the project.

1.14 FIRE PROTECTION FACILITIES

.1 Provide fire extinguishers and other equipment on site and maintain emergency vehicle access at all times.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

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

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121.

.2 Apply plywood panels vertically as indicated.

.3 Paint public side of hoarding.

.4 Provide lockable pedestrian doors.

1.4 GUARD RAILS AND BARRICADES

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

1.5 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.

1.6 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.

1.7 ACCESS TO SITE

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

1.8 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.

1.9 FIRE ROUTES

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

1.10 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.

1.11 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 Confirm locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.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

.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 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 communicate and notify at commencement of Work and should it subsequently appear that Work may be delayed for such reason. Rights are reserved to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

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

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense.

.9 Touch-up damaged factory finished surfaces. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by facility will be paid for by facility. Unload, handle and store such products.

1.6 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 in writing, of conflicts between specifications and manufacturer's instructions, so that a course of action can be established.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by licensed or qualified workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Rights are reserved to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings,except where indicated otherwise.

.2 Before installation inform if there is interference. Install as directed.

1.10 REMEDIAL WORK

.1 Refer to Section 01 73 00 - Execution Requirements.

.2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicatedas approximate.

.2 Inform of conflicting installation. Install as directed.

1.12 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish asadjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securingexterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval.

1.15 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, including PCA owned utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, building occupants, and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify of findings.

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed. Document on as-builts.

1.2 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 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.

.3 Inform of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required.

1.3 SUBSURFACE CONDITIONS

.1 Promptly notify in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, if conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

1.4 EXISTING DOORS AND WINDOWS PHOTOGRAPHIC DOCUMENTATION

.1 Provide interior and exterior, high resolution photographs of all existing windows and doors to be altered.

.2 Take photos as flat on as possible to eliminate perspective distortion.

.3 Note window material, finish, glazing, frame sizes, and mullion sizes.

.4 Note opening finishes and conditions, hardware, rough dimensions and anomalies with contract documents. Assemble documentation into pdfs on one 8 ½ x 11” page per side of door or window, minimum.

.5 Add pages for photos of typical window or door details with sketches if appropriate.

.6 Identify window which is to be salvaged.

.7 Submit new photos every 2 weeks as existing windows are being replaced.

.8 Submit for review and revise as necessary.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Historic elements.
- .6 Work of separate contractor.

.3 Include in request:

- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 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 devicesand methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncoveringwork; maintain excavations free of water.

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 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.8 Employ qualified installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.10 Restore work with new products in accordance with requirements of Contract Documents.

.11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material.

.13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Not used.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed. Do not burn waste materials on site.

.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 and use marked separate bins for recycling. Refer to Section 01 74 19- Waste Management and Disposal .

.6 Dispose of waste materials and debris at designated dumping areas outside of Park boundaries.

.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.

1.3 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 caused by other Contractors.

.5 Remove waste materials from site or dispose of as directed. Do not burn waste materials on site.

.6 Make arrangements with and obtain permits from authorities having jurisdictionfor 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 and 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 workmanshipand operation.

.13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfacesof 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 ofmechanical equipment.

.18 Remove snow and ice from access to building.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Owner has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-demolition and Pre-construction Meetings: Arrange both a pre-demolition and pre-construction meeting, prior to each phase respectively, in accordance with Section 01 31 19 – Project Meetings before starting any Work of the Contract attended by the Contractor, affected Subcontractor's and Consultant to discuss the Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.3 SUBMITTALS

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Construction Waste Management Plan (CWM Plan) : Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:

.1 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.

.2 Landfill Materials: Identify materials that cannot be recycled, reused or composted and provide explanation or justification; energy will be considered as a viable alternative diversion strategy for these materials where facilities exist.

.3 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.

.4 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

.5 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

.6 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 (CWM PLAN) IMPLEMENTATION

.1 Instruction: Provide on site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.

.2 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.

.3 All receipts from waste disposal shall be provide to the Departmental Representative after disposal.

.4 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Submit O&M documents for review at minimum 2 weeks prior to substantial completion. Substantial completion will not be awarded without O&M submittal.

.2 Contractor's Inspection: Conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify in writing of satisfactory completion ofContractor's inspection and submit verification that corrections have been made.

.2 Request inspection.

.3 Consultant's Inspection:

.1 Team and Contractor to inspect Work and identify obvious defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks havebeen 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 Boiler Inspection Branch: submitted.

.5 Operation of systems: demonstrated to Owner's personnel.

.6 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by the Team, and Contractor.

.2 When Work incomplete according, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when deficiencies and defects are considered corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of 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 final deficiencies and defects are considered 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 00 - 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 19- Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with contractor's representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 Consultant 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 Two weeks prior to Substantial Performance of the Work, submit, four final copies of operating and maintenance manuals in English and French, a USB including PDF to be searchable and linked within documents.

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

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

1.3 FORMAT

.1 Organize data as instructional manual.

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

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

.1 Identify contents of each binder on spine.

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

.5 Arrange content by process flow, 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 Sections: For all sections, provide supplier or manufacturer’s contact information. Including name, address, phone number, website and email, as applicable.

.8 Drawings: provide with reinforced punched binder tab.

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

.9 Electronic Submission:

.1 Provide electronic submission in PDF format.

.2 PDF document to be linked and searchable.

.10 Hard Copy Submission: Provide 3 printed copies as outlined in the format above.

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.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, one record copy of:

.1 Contract Drawings, marked up with applicable changes.

.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.

.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 field test records, required by individual specifications sections.

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

1.7 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.

1.8 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 location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing.

.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 location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing.

.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 location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Consultant.

.2 Include approved listings in Maintenance Manual.

1.9 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.

1.10 WARRANTIES AND BONDS

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

.2 Submit warranty management plan, prior to Substantial Completion as part of O&M documents, to Departmental Representative’s approval.

.3 Warranty management plan to include required actions and documents to assure that Owner 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, 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 permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint 4 month and 9 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, to include roofs.

.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 9 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 to proceed with action against Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes the following:

- .1 Removal of building equipment and fixtures as required to facilitate renovations.
- .2 Removal of designated partitions and components and noted portions and parts of the existing building.
- .3 Temporary bracing and shoring.
- .4 Protective hoardings and barricades.
- .5 Temporary partitions to allow continued building occupancy.

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI):

- .1 ANSI/ASSE A10.6, Safety & Health Program Requirements for Demolition Operations, 2006.

.2 CSA Group (CSA)

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

.3 Department of Justice Canada (Jus)

- .1 Canadian Environmental Assessment Act (CEAA), 2012
- .2 Canadian Environmental Protection Act (CEPA), 2012
  - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
  - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
  - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
  - .4 Motor Vehicle Safety Act (MVSA), 1995
  - .5 Hazardous Materials Information Review Act, 1985

.4 National Fire Protection Association (NFPA)

- .1 NFPA 241 - 96, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.3 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

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

.3 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Construction Waste Management and Disposal.

.4 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Construction Waste Management and Disposal

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate the material ownership including but not limited to:

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

.2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value that may be encountered during demolition remain Owner's property. Care must be taken to ensure no damage shall occur.

.2 Scheduling:

.1 In event of unforeseen delay, give notification.

1.5 SUBMITTALS

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

.2 Submit a demolition procedure and methods schedule/plan for approval and review before mobilization and commencement of demolition work. Include interior and exterior finishes, as well as sill materials, window number identified.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA and TDGA.

.2 Comply with hauling and disposal regulations of authority having jurisdiction.

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

1.7 EXISTING CONDITIONS

.1 If material resembling spray or trowel-applied asbestos, other designated substance, or if material is suspected to contain any hazardous substances be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.

.1 Proceed only after receipt of written instructions have been received.

.2 Notify departmental representative 72 hours before disrupting building access or services.

Part 2 Products

2.1 EQUIPMENT

.1 Equipment and heavy machinery:

.1 Machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 EXAMINATION

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

.2 It is not guarantied that existing conditions are the same as those indicated in Project Record Documents.

.3 Inventory and record the condition of items being removed and salvaged.

.4 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.

.5 Promptly submit a written report.

.6 Notify the Departmental Representative if removal of any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during demolition operations.

.7 Verify that hazardous materials have been remediated before proceeding with demolition operations.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Prevent movement, settlement, or damage to adjacent parts of building to remain in place. Provide bracing and shoring required.

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

.3 Protect building systems, services and equipment.

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

3.3 DEMOLITION/REMOVAL

.1 Do Work in accordance with Section 01 35 29- Health and Safety Requirements.

.2 All cutting and removal of existing finishing wood, stone, concrete and metal materials are to be approved by Consultant in writing.

.3 Existing stone shall not be cut or damaged in any way by the work. Refer to Section 04 03 43.19 for Dismantling Stone Masonry.

.4 Remove parts of existing building to permit new construction.

.5 Trim edges of partially demolished building elements to tolerances as defined by Consultant to suit future use.

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

.7 Protect interiors of parts not to be demolished from exterior elements at all times.

.8 Demolish to minimize dusting.

.9 Salvage:

.1 Carefully remove without damage, existing window identified, by the Consultant, to be retained by the Owner.

.2 Protect, carefully package, crate and deliver to location identified by the Owner.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

.3 Refer to demolition drawings and specifications for items to be salvaged for reuse.

.4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

.1 Selective demolition of building elements for alterations purposes. Note existing ceiling to be removed by others.

.2 Abandonment and removal of existing utilities and utility structures.

1.3 RELATED REQUIREMENTS

.1 Section 01 11 00 - Summary of Work: Limitations on Contractor's use of site and premises.

.2 Section 01 11 00 - Summary of Work: Description of items to be salvaged or removed for re-use by Contractor and Heritage Character Statement.

.3 Section 01 52 00 - Construction Facilities: Site fences, security, protective barriers, and waste removal.

.4 Section 01 61 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

.5 Section 01 73 00 - Execution: Project conditions; protection of benchmarks, survey control points, and existing construction to remain; reinstallation of removed products.

1.4 SUBMITTALS

.1 See Section 01 33 00 - Submittal Procedures, for submittal procedures.

.2 Demolition Plan: Submit in conjunction with demolition plan for minor works as specified in section 02 41 00.08

- .1 Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
- .2 Identify demolition firm and submit qualifications.
- .3 Include a summary of safety procedures.
- .4 Submit data for proposed dust-control measures.

.3 Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.5 QUALITY ASSURANCE

.1 Participate in pre-demolition walk-through for identification of items to be salvaged and items to be removed for reinstallation.

.2 Pre-demolition walk-through shall occur less than 7 days after project award of project, prior to mobilization and start-up meeting.

1.6 HAZARDOUS MATERIALS

.1 All Contractors performing demolition Work are to obtain a copy of the "Limited Hazardous Material Assessment in Advance of the Window Replacement" by EHS Partnership Ltd (see appendix) from the Consultant and familiarize themselves with the types and locations of all known hazardous materials.

.2 Contractor to coordinate hazardous materials removal with identified project phasing.

.3 Removal and disposal of Hazardous Materials to be as directed in the hazardous materials removal specifications using a qualified and experienced hazardous material removal contractor in accordance with the requirements Parks Canada and WorkSafeBC. Hazardous removal contractor shall be approved by the Department Representative and Consultant prior to commencing with demolition work.

.4 Do not commence demolition operations until all hazardous materials have been removed and areas to be demolished have been inspected and approved by the parks Canada Department Representative, after the hazardous materials have been removed.

.5 Cease operations and notify the Department Representative and Consultant immediately if unexpected hazardous materials are encountered.

Part 2 Products

Not Used.

Part 3 Execution

3.1 SCOPE

.1 Demolition of all items at once is not permitted. Demolition to be coordinated with and clearly identified within the construction schedule.

.2 Remove portions of existing in areas as shown on Drawings.

.3 Remove selective windows and doors.

1. No more than on opening shall be left to be incomplete at a time.

.4 Asbestos and Lead Abatement: Remove or encapsulate hazardous asbestos and lead containing materials to WorkSafe BC regulations, to be done by certified Contractor. Refer to Hazardous Material Report Appendix.

.5 Remove other items indicated, for salvage, relocation, and recycling. Coordinate the location for storage of salvaged and reused items.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

.1 Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

- .1 Obtain required permits.
- .2 Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
- .3 Provide, erect, and maintain temporary barriers and security devices.
- .4 Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
- .5 Conduct operations to minimize effects on and interference with adjacent structures and occupants.
- .6 Do not close or obstruct roadways or sidewalks without permit.
- .7 Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at anytime; protect persons using entrances and exits from removal operations.

.2 Do not begin removal until receipt of notification to proceed.

.3 Protect existing structures and other elements that are not to being removed.

.1 Provide bracing and shoring.

.2 Prevent movement or settlement of adjacent structures.

.3 Stop work immediately if adjacent structures appear to be in danger.

.4 If hazardous materials, other than those identified, are discovered during removal operations, stop work and notify Consultant and Owner; hazardous materials may include but is not limited to regulated asbestos containing materials, lead, PCB's, and mercury.

.5 Perform demolition in a manner that maximizes salvage and recycling of materials.

.1 Dismantle existing construction and separate materials.

.2 Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.3 EXISTING UTILITIES

.1 Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

.2 Protect existing utilities to remain from damage.

.3 Do not disrupt public utilities without permit from authority having jurisdiction.

.4 Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification.

.5 Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification.

.6 Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

.7 Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

.1 Drawings showing existing construction and utilities are based on casual field observation and available existing record documents only.

.1 Verify that construction and utility arrangements are as shown.

.2 Report discrepancies to Architect before disturbing existing installation.

.3 Beginning of demolition work constitutes acceptance of existing conditions.

.2 Separate areas in which demolition is being conducted from other areas that are still occupied.

.1 Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 52 00 - Construction Facilities in locations indicated on drawings.

.3 Remove existing work as indicated and as required to accomplish new work.

.1 Remove items indicated on drawings.

3.5 DEBRIS AND WASTE REMOVAL

.1 Remove debris, junk, and trash from site.

.2 Leave site in clean condition, ready for subsequent work.

.3 Clean up spillage and wind-blown debris from public and private lands.

3.6 HERITAGE WINDOW REHABILITATION

1. At instances where windows will be replaced, if existing window is a heritage window as designated on drawings, the existing heritage window will be rehabilitated for future use.

2. Remove heritage window without damaging any components thereof.

3. Transport and store existing heritage window in a location on site without damaging any components thereof. Store in cool and dry environment. Coordinate with Departmental Representative for storage location.

4. Submit rehabilitation procedures and demolition procedures as required by article 1.4.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Reference Standards:

.1 ASTM International

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

.2 ASTM C494/C494M-15a Standard Specification for Chemical Admixtures for Concrete.

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

.2 CSA International

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

.2 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.

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

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-construction Meetings: in accordance with Section 01 31 19, convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Structural Consultant, specialty contractors - finishing and forming - attend.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 At least 2 weeks prior to beginning Work, submit grout/patching materials manufacturers information.

.3 Prepare bagged concrete and grout on site per manufacturer's recommendations.

1.4 QUALITY ASSURANCE

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

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

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

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

.1 Falsework erection.

.2 Hot weather concrete.

.3 Curing.

.4 Finishes.

.5 Formwork removal.

.4 Quality Control Plan: provide written report, test data, or other documentation to Departmental Representative verifying compliance that concrete/grout in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.5 INSPECTION AND TESTING OF GROUT

.1 Test all grout by a testing firm certified in accordance with CSA-A283, retained and paid for by the Contractor.

.2 Provide at least two (2) cube tests for each type of non-shrink grout used. Provide minimum of one (1) test per day during grout installation, taking cube sample from grout being placed during the day.

Part 2 2 - Products

2.1 DESIGN CRITERIA

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

2.2 PERFORMANCE CRITERIA

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

2.3 MATERIALS

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

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

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

.4 Water: to CSA A23.1.

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

.6 Admixtures:

.1 Air entraining admixture: to ASTM C 260.

.2 Chemical admixture: to ASTM C 494 and ASTM C 1017. Structural Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.3 Corrosion-inhibiting admixture: to ASTM C 494.

.4 Lithium-based admixture: to ASTM C 494.

.5 Shrinkage-reducing admixture (SRA): to ASTM C494 and ASTM WK 23938.

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

.1 Compressive strength: 40 MPa at 28 days.

.2 Net shrinkage at 28 days: maximum 0%.

.8 Non-premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 40 MPa at 28 days.

2.4 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Structural Consultant performance criteria to CSA A23.1/A23.2 and the approved table of Pre-Bagged Concrete Repair Products as listed below:

.2 Minimum 28day compressive strength for any grouting/patching product to be 40MPa.

Manufacturer	Product
Sika	Sika MonoTop 623
BASF Building Systems	Master Emaco N 425
Mapei	Planitop 12 SR
Or Approved Equivalent	

Part 3 EXECUTION

3.1 PREPARATION

.1 Obtain Structural Consultant's written approval before placing grout/patching materials.

.1 Provide 48 hours minimum notice prior to placing of grout/patching materials.

.2 Prepare surface for patching per manufacturers requirements. For areas with larger patches, provide shoring of the slabs as determined by contractor's shoring contractor.

.3 Protect previous Work from staining and damage.

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

.5 Do not place load upon newly grouted areas until authorized.

3.2 INSTALLATION/ APPLICATION

.1 Pre-Bagged Concrete Product to be installed as per the manufacturer's instructions.

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

3.3 FIELD QUALITY CONTROL

.1 Test all concrete by a testing firm certified in accordance with CSA A283, retained and paid for by the Contractor and approved by the Departmental Representative.

.2 Provide casual labour to the testing firm's field personnel for the purpose of obtaining, handling, and storing sample materials. Provide free access to all portions of the work and cooperate with the testing firm.

.3 Advise testing firm 24 hours in advance of grout placement.

.4 Testing firm is to review all mix designs submitted and confirm in writing that all strength and durability requirements specified will be achieved. Submit minimum 5 days in advance of work.

.5 Testing firm to conduct all tests in accordance with CSA A23.2.

.6 Samples of concrete/grout to be taken as close to the point of final installed location.

.7 Testing firm is to report results of tests immediately to the Contractor. The Contractor is responsible for ensuring that the grout meets the requirements of the specifications. Report adverse test results to the immediately.

.8 Testing firm is not authorized to revoke, relax, enlarge or release any requirements of the specification, nor to approve or disapprove any portion of the work.

.9 Testing firm is to submit to the Departmental Representative and Contractor certified copies of test results.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.1 Divert unused concrete materials from landfill.

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

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

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

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

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

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Conduct a pre-dismantling meeting to verify project requirements, equipment, procedures and assigned storage areas. Comply with Section 01 31 19.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit method of reference numbering for dismantling stone prior to start of stone removal for approval.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer with experience in rehabilitating historic structures registered or licensed in the province of British Columbia

.2 Submit drawings for bracing.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual. Include:

.1 Photographically record stonework to be dismantled and rebuilt.

.2 Record drawings of layout of stored stones.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Masonry Contractor:

.1 Work of this Section: executed by contractor specializing in historic stone conservation work, using similar stone dismantling techniques.

.2 Foreperson:

.1 Provide competent trade foreperson specializing in type of work required.

.2 Experience: experience in deconstruction of historic stone masonry. Must be present on site throughout Work.

.3 Dismantlers:

.1 Experience: record of successful masonry dismantling.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Protect and store stones to facilitate their resetting.

.1 Store dismantled masonry units on wood pallets, protected from exposure to water, elements, and potential mechanical damage fully covered under polyethylene.

1.6 AMBIENT CONDITIONS

.1 Loosen wet masonry only when temperature is above 5 degrees C.

.2 In temperature 5 degrees C and below, provide heat and hoarding as necessary to:

.1 Keep stones dry.

.2 Protect wet stones from freezing.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 EXAMINATION

.1 Examine masonry, staging and storage areas and notify Consultant in writing of conditions detrimental to acceptable and timely completion of Work.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Obtain approval for alternative methodology and tools to be employed before commencing the work.

.2 Clean stone surface of dust and stone chips.

3.3 PROTECTION

.1 Prevent damage to building which is to remain. Make good damage incurred.

.2 Protect surrounding components from damage during work.

.3 Make good damage to historic fabric.

.4 Obtain approval for repair methodology.

3.4 SPECIAL TECHNIQUES

.1 Contractor to submit dismantling and reinstallation plan of heritage masonry in conjunction with demolition plan.

.2 If an existing stone is found to have been damaged prior to this work, or as a result of this work, it must be reported and repaired. If repair of existing stone is not possible then it must be replaced with a new stone product. Shop drawings for repair must be submitted, as well as one mock-up prior to repairing any other damaged stones. Shop drawings for replacement must be submitted.

.3 Before dismantling stones, indicate dimensions of each stone in removal area on a drawing and chart or index card.

.4 Temporary Marking and Recording of Original Stone:

.1 Mark stone, on face, before removal using marking product which can be completely erased when required without damaging masonry unit:

.1 Ball-point pen on diachylon, attached to stone.

.2 Waxless chalk directly on stone.

.2 Tracking relocated stones and other masonry units:

.1 Use numbering, marking, and positioning system to approval of Consultant.

.3 Mark/Identify:

.1 Stones and other elements or components to show identity and position.

.2 Wood platforms or other equipment used to transport and store stones.

.3 Work and storage areas.

.4 Location from which stones are removed on drawings, photographs and chart or card-index.

.4 Stone location recording system.

.1 Prepare chart or card index to:

.1 Help locate stones or units when necessary.

.2 To manage availability of platforms.

.3 To manage work and storage areas.

.2 Keep chart or card index up-to-date and, if required, produce copy every day.

.3 Prepare chart or card index to contain relevant information system to approval.

.5 Ensure that temporary marking will remain in use resistant to weather, handling and cleaning until final marking of stones.

.6 Remove markings and adhesive without damaging units:

.1 Brush with vegetable fibre brush: either dry or with water.

.2 Use no solvent, acid or other chemical product

3.5 TEMPORARY SHORING

.1 Construct shoring and cradling, and other temporary framing work needed to support structure, or parts of it, during removal operations, according to approved shop drawings.

3.6 METHOD FOR LOOSENING STONES

.1 Use approved methods to loosen stones which will cause no damage either to stones or to other architectural elements.

.2 Prior to removing a stone approved for replacement or re-installation, rout out existing mortar joints around the stone.

.3 Remove mortar from top, bottom and side joints, with the back surface of the joint square and of an even depth.

.4 Use only hand held tools with mallet or pneumatic driven percussion at low stroke speed.

.5 Obtain approval for use of power tools before commencing work.

.6 Ensure that adjacent stones are not used as lever points in removal of stone.

.7 Loosen wet masonry when temperature is above freezing.

3.7 DISMANTLING AND MOVING STONES

.1 Avoid damaging arises of stone when removing mortar and freeing up.

.2 Remove excess mortar using hand tools.

.3 Use wood wedges where required to remove or dislocate stone.

.1 Use flat pry bars protected with impact absorbing protection (burlap, cardboard).

.4 Protect stone from damage when hoisting and lifting from position.

.5 Where damage occurs to stone, report and repair stone to match existing. See note 3.4.2.

.6 Make good damage incurred at no additional cost to Contract.

.7 Obtain approval of repaired damage.

3.8 HANDLING

.1 Place detached stones on wood surfaces during handling. Prevent contact with metal.

.2 When stones are lowered to ground, place directly on wooden platform used for transport or storage.

.3 Transport and keep stones on wooden platforms.

.4 Ensure that sharp edges of stones do not come into contact with hard objects.

3.9 TEMPORARY STORAGE STAGING AREA

.1 Place stones in designated area of site for cleaning, detailed inspection and for final marking, before storage.

.2 Make stones accessible and retrievable when required.

3.10 CLEANING

.1 Clean stones by wet scrubbing with vegetable fiber brush unless otherwise instructed by Consultant.

.1 Do not use high pressure water jet.

.2 Remove excess mortar with hand tools.

.2 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section.

3.11 FINAL MARKING

.1 Do final marking after cleaning, on surface that supports good adhesion and legibility and will not be visible after resetting.

.2 Ensure that marking product used will not affect mortar to stone adhesion when resetting.

.3 Ensure marking product used will survive storage until resetting of stone.

3.12 FINAL STORAGE

.1 When stones are placed under shelter:

.1 Design and ventilate shelter to keep condensation from forming on internal surfaces.

.2 Lay out storage so that each stone will have its numbered face visible and be accessible or removable without having to move adjacent stones.

.3 Show layout of stones to be stored on record drawing.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.

.2 CAN/CSA-A371-14, Masonry Construction for Buildings.

.2 International Masonry Industry All-Weather Council (IMIAC)

.1 Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation meetings: comply with Section 01 31 19- Project Meetings. Conduct pre-construction meeting one week prior to commencing work of this Section to:

.1 Verify project requirements, including mock-up requirements.

.2 Verify substrate conditions.

.3 Co-ordinate products, installation methods and techniques.

.4 Sequence work of related sections.

.5 Co-ordinate with other building subtrades.

.6 Review manufacturer's installation instructions.

.7 Review masonry cutting operations, methods and tools and determine worker safety and protection from dust during cutting operations.

.8 Review warranty requirements.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Product Data: Provide in accordance with detailed information specified in Related Requirements.

.2 Samples: Provide in accordance with detailed information specified in Related Requirements.

.3 Shop Drawings:

.1 Where existing masonry becomes laterally unsupported during restoration work, provide shop drawings for temporary bracing, stamped by a Professional Engineer registered in the Province of B.C.

.2 Provide other specific shop drawings in accordance with detailed information specified in Related Requirements.

1.4 CLOSEOUT SUBMITTALS

.1 Submit manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00- Closeout Submittals.

1.5 EXTRA MATERIALS

.1 Submit manufacturer's instructions in accordance with Section 01 78 00 - Closeout Submittals covering maintenance requirements and parts catalogue, with cuts and identifying numbers.

1.6 QUALITY ASSURANCE

.2 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 45 00.

.2 Notify minimum of 72 hours prior to construction of the mock-up.

.3 Construct mock-ups where directed and to demonstrate the following:

.1 Stone Repair:

.1 Stone resetting repair. Complete one and review before moving on to complete others.

.2 Repair mortar replacement.

.2 Saw cutting of joints using power tools, where permitted. Saw cutting is not permitted unless requested in writing subsequent to demonstration of skill on mock-up which is not part of the building.

.3 Raking out of mortar: 4 lineal metres of each type of stonework including horizontal and vertical joints both above grade and below grade.

.4 Repointing: Each type of stonework and mortar type, including junctions at differing stonework and methodology to meet environmental requirements for mortar curing. Location and extents as indicated.

.5 Cleaning: Each type of stone to level specified in 04 03 06. Illustrate protection of openings in walls, cleaning techniques required representative of full range of soiling or stains. Locations to be determined.

.4 Conduct Mock-Up demonstrating procedures for loosening and removal of stones. Demonstrate use of each type of connectors and accessories.

.1 Dismantling procedures: 1.0 m x 1.0m.

.5 Allow 72 hours for inspection of mock-ups before proceeding with work.

.6 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

.7 Start work only upon receipt of written acceptance of mock-up by Consultant.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Protection:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.1 Ensure that manufacturer's labels and seals are intact upon delivery.

.2 Keep material dry until use. Protect from weather, freezing and contamination.

.1 Store cementitious materials and aggregates in accordance with CSA A23.1/A23.2.

.3 Remove rejected or contaminated material from site.

.4 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

.3 Packaging Waste Management: Remove for reuse and return by manufacturer of pallets, crates, paddling, and packaging materials in accordance with Section 01 74 19.

1.8 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components when temperatures are above 4 degrees C. Provide heat and hoarding as necessary.

.2 Weather Requirements: to CAN/CSA-A371 and to IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

.3 Cold weather requirements:

.1 To CAN/CSA-A371 with following requirements.

.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.

.2 Maintain ambient temperature of masonry work and its constituent materials between 5 degrees C and 50 degrees C and protect site from windchill.

.3 Maintain temperature of masonry above 0 degrees C for minimum of 7 days, after mortar is installed.

.4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10 degrees C, before applying mortar.

.2 Hot weather requirements:

.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

.3 Spray mortar surface at intervals and keep moist for maximum of 3 days after installation.

Part 2 Products

2.1 MATERIALS

.1 Masonry materials are specified elsewhere in related Sections:

.1 Section 04 05 13 - Masonry Mortaring and Grouting

Part 3 Execution

3.1 INSTALLERS

.1 Experienced and qualified masons to carry out erection, assembly and installation of masonry work.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work specified in Related Requirements.

.1 Co-ordinate with Section 01 7100.

.2 Inform of unacceptable conditions immediately upon discovery.

.3 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval.

.2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.

.3 Verification of Conditions:

.1 Verify that:

.1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete block or re-installation of dismantled stone masonry.

.2 Field conditions are acceptable and are ready to receive work.

.3 Built-in items are in proper location, and ready for roughing into masonry work.

.2 Commencing installation means acceptance of existing substrates and conditions.

.4 Site Photographs of Masonry and Conservation:

.3 Prior to commencement of surface treatment, document with archival photographic document the work areas.

3.3 PREPARATION

.1 Establish and protect lines, levels, and coursing.

.2 Support:

.1 Contractor to submit documents and shop drawings for review, demonstrating sequence of removal and re-building including limitations, sequencing and schedule of removal areas, and must provide and construct shoring and temporary framing work to support structure and wall elements during removal and resetting operations, in accordance with approved shop drawings. Drawings to be stamped and signed by a Professional Engineer experienced with masonry structures and registered in Province of B.C. Schedule and sequence of work must account for required adjacent works, wall depth and composition, as well as required curing, setting and hardening time for mortars of other new work.

.2 Leave work in safe condition when work is not in progress.

.3 Protect adjacent materials from damage and disfiguration.

.4 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

.1 Bracing must be approved by Consultant.

.2 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

.5 Winter Heating:

.1 Maintain ambient humidity levels.

.2 The use of open flame to provide heating is forbidden.

3.4 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.4 Limitations on Work Sequence and Timing:

.1 Install the structural steel and anchors only in restored masonry. Restore the back up masonry before mounting the steel frame.

.2 Allow for 28-day curing period before coring in the newly restored masonry.

.3 Allow for 14-day curing period before coring in masonry within a 3 m radius of newly restored masonry.

.4 Restore the stone in vertical order starting from the lower sections.

.5 Maintain stability of existing wall by implementing the following measures:

.1 Limit contiguous dismantled stone areas to three courses in height, unless otherwise approved.

.2 Limit stone rebuilding areas to three courses in height per day.

.6 Thoroughly humidify the core by dampening with water prior to placing mortar.

.7 Mortar to be placed into bedding location for each stone

.8 Maintain original joint dimensions/widths.

.9 Ensure stone is level and plumb.

.10 Gauge mortars to make certain stone is 100% bedded on all joint sides.

.11 Ram mortar with thin metal tool in preparation for front pointing.

.12 Top stone or course of stones of rebuilt area must be thoroughly packed, rammed with mortar to ensure no voids and temporarily shimmed to maintain correct position and alignment.

.13 Set stones in their natural bedding orientation and in their original orientation (i.e. top up).

.14 Perform front pointing and mortar repairs after cleaning. Perform.

3.5 CONSTRUCTION

.1 Exposed masonry:

.1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.

.2 Jointing:

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.

.2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.

.3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.3 Cutting:

.1 Make cuts straight, clean, and free from uneven edges.

.4 Building-In:

.1 Build in items required built into masonry.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Interface with other work:

.1 Cut openings in existing work as indicated.

.2 Approved openings in walls.

.3 Make good existing work. Use materials to match existing.

3.6 SITE TOLERANCES

.1 Tolerances in notes to CAN/CSA-A371 apply.

3.8 SITE QUALITY CONTROL

.1 Testing and inspection agency will be approved by the Departmental Representative.

.1 Testing on all types of mortars and grouts in the project (grouting, bedding mortar, front pointing mortar and back pointing mortar) shall be carried out by a Testing Laboratory approved by the Departmental Representative. The laboratory tests shall occur once a week (2 tests on each type of mortar) during the entire grouting and mortaring operations throughout the project on all types of mortars and grouts. The tests shall be done with on-site fresh mixed samples and shall include the compressive strength at 7 days, 28, and 90 days, air entrainment percentage, Vicat cone testing (mortar only) and flexural strength.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

3.10 PROTECTION

.1 Temporary Bracing:

.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

.2 Approved bracing.

.3 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

.2 Moisture Protection:

.1 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until completed and protected by flashing or other permanent construction.

.2 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

.3 Air Temperature Protection: protect completed masonry as recommended in 1.8, SITE CONDITIONS.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

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

.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.

.3 CAN/CSA-A371-14, Masonry Construction for Buildings.

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

.2 International Masonry Industry All-Weather Council (IMIAC)

.1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Samples: submit unit samples in accordance with Section 04 05 00- Common Work Results for Masonry, supplemented as follows:

.1 Submit two samples of mortar for each type

.4 Manufacturers' Instructions: submit manufacturer's installation instructions.

.5 Mortar analysis report: Submit report of existing mortar analysis per 1.3.3 of this Section.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CSA A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

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

.3 Analyze existing mortar for stone work for chemistry, water absorption, colour, compressive strength, etc. to obtain similar properties for new mortar mix.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect masonry mortar and grout from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 19.

1.5 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Weather Requirements: International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

Part 2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Cement:

.1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement, grey colour.

.1 Use low VOC products in compliance with SCAQMD Rule 1168.

.2 Masonry Cement: to CAN/CSA-A3002 and CSA A179, Type N.

.3 Mortar Cement: to CAN/CSA-A3002 and CSA A179, Type N.

.1 Use low VOC products in compliance with SCAQMD Rule 1168.

.4 Packaged Dry Combined Materials for mortar: to CSA A179, Type N, using gray colour cement.

.3 Aggregate: supplied by one supplier.

.1 Fine Aggregate: to CSA A179, natural sand.

.2 Course Aggregate: to CSA A179.

.4 Water: clean and potable.

.5 Lime:

.1 Hydrated Lime: to CSA A179, Type S.

.6 Bonding Agent: latex type.

.7 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.

2.2 COLOUR ADDITIVES

.1 Use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample. Admixtures approved prior to use. Use in accordance with specific manufacturer's recommendations.

.2 White mortar: use white Portland cement, and lime to produce mortar colour if required.

.3 Powder: inorganic mineral oxide pigment; to match existing.

2.3 ADMIXTURES

.1 Do not use admixtures except upon written approval.

2.4 MORTAR MIXES

.1 Mortar for repointing stone masonry: match existing, to CSA A179.

.2 Mortar for concrete block: type N to CSA A179.

2.5 MORTAR MIXING

.1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to within 1% accuracy.

.2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.

.3 Maintain sand uniformly damp immediately before mixing process.

.4 Using anti-freeze compounds including calcium chloride or chloride based compounds is prohibited.

.5 Adding air entraining admixture to mortar mix is prohibited.

.6 Use a batch type mixer in accordance with CAN/CSA-A179.

.7 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.8 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.

.9 Use mortar within 2 hours after mixing.

2.6 MIX TESTS

.1 Testing Mortar Mix:

.1 Test mortar to requirements of Section 01 45 00- Quality Control, and in accordance with CAN/CSA-A179, for mortar based on property specification . Test prior to construction for:

.1 Compressive strength.

.2 Consistency.

.3 Mortar aggregate ratio.

.4 Sand/cement ratio.

.5 Water content and water/cement ratio.

.6 Air content.

.7 Splitting tensile strength.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed.

3.2 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.

3.3 MIXING

.1 Pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes. Mixing by hand pre-approved.

.2 Clean mixing boards and mechanical mixing machine between batches.

.3 Mortar: weaker than units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In event that this individual is changed, mortar mixing must cease until new individual is trained, and mortar mix is tested.

3.4 MORTAR PLACEMENT

.1 Install mortar to requirements of CAN/CSA-A179.

.2 Remove excess mortar from grout spaces.

3.5 FIELD QUALITY CONTROL

.1 Site Tests, Inspection: in accordance with Section 04 05 00- Common Work Results for Masonry supplemented as follows:

.1 Test and evaluate mortar during construction in accordance with CAN/CSA-A179.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Remove droppings and splashing using clean sponge and water.

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.7 PROTECTION

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A 307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A108, “Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality”. CAN/CSA-G40.21-98, “Structural Quality Steels”.

.4 ASTM A123, “Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products”.

.2 CSA International

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

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

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

.3 Green Seal Environmental Standards (GS)

.1 GS-11-2011, 3rd Edition, Paints and Coatings.

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

.1 Material Safety Data Sheets (MSDS).

1.2 QUALIFICATIONS

.1 The organization undertaking to weld under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W47.1, Division 1 or 2.1 only. Division 3 qualification is not sufficient.

.2 Weld inspection: The organization undertaking to perform weld inspection under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W178.

.3 Engage a professional structural engineer registered in the Province of British Columbia fully qualified and experienced in the design of bearings and welded components to be responsible for the design of welded components.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections and bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements.

.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:

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

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

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

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W, 350W, shop primed finish.

.2 Welding materials: to CSA W59.

.3 Welding electrodes: to CSA W48 Series.

.4 Bolts and anchor bolts: as per design notes on S0.2.

.5 Grout: non-shrink, non-metallic, dry pack, 40 MPa at 28 days.

.6 Finish all steel components in accordance with the following:

.1 Blast cleaned in accordance with SSPC-SP6 “Commercial Blast Cleaning”.

2.2 FABRICATION

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

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

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

2.3 FINISHES

.1 Zinc primer: zinc rich, ready mix to MPI- EXT 5.2C

.2 Powder Coating: TIGER Drylac® Series 38 or approved alternate, colour to be confirmed via shop drawing submittal.

2.4 SHOP PAINTING

.1 Primer: VOC limit 100 g/L maximum to GS-11.

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

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 ERECTION

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

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative.

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

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Touch-up field welds, bolts and burnt or scratched surfaces with primer after completion:

.1 Primer: maximum VOC limit 100 g/L to GS-11.

3.3 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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

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

3.5 GUARANTEE

.1 Certify that all designed components are fabricated and erected in accordance with the reviewed shop drawings.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM Standards (ASTM)

.1 ASTM D1621-10: Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.

.1 ASTM D1622-08: Standard Test Method for Apparent Density of Rigid Cellular Plastics.

.2 ASTM D6226-15, Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S101-07, Standard Methods of Fire Tests of Building Construction and Materials.

.2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.3 CAN/ULC-S705.1-01, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification. Includes Amendment 1.2.

.4 CAN/ULC-S705.2-05 , Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for polyurethane foam sprayed insulation and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Test Reports:

.1 Submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturer: company with experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.

.2 Health and Safety Requirements: worker protection:

.1 Protect workers as recommended by CAN/ULC-S705.2 andmanufacturer's recommendations:

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00 - Common Product Requirements.

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

1.5 SITE CONDITIONS

.1 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

.2 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.4 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

Part 2 Products

2.1 MATERIALS

.1 Insulation: spray polyurethane to CAN/ULC-S705.1, with the following properties:

.1	Density (ASTM D1622):	min 28 kg/m3
.2	Thermal resistance (LTTR) (ULC S705.1):	min 1 RSI
.3	Compressive Strength (ASTM D1621) parallel to rise:	min 95 kPa
.4	Closed Cell content (ASTM D6226):	min 90%
.5	Air Permeance (ASTM ASTM E283) @ 13 mm thickness:	max 0.02 L/s/m2
.6	Fire Rating (CAN/ULC S102)	
	Flame Spread Index:	max 25
	Smoke Developed:	max 450

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sprayed insulation application accordance with manufacturer's written instructions.

3.2 APPLICATION

.1 Apply insulation to clean surfaces in accordance with manufacturer's printed instructions.

.2 Use primer where recommended by manufacturer.

.3 Apply sprayed foam insulation as indicated and to as required maintain continuity of the building envelope.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.

.1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 The Aluminum Association Inc. (AAI)

.1 AA Aluminum Design Manual 2015, Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.

.2 AAI DAF45-2003(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)

.1 AAMA 611-14, Voluntary Specifications for Anodized Architectural Aluminum.

.3 ASTM International

.1 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.4 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)

.1 Architectural Sheet Metal Manual (2012)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Submit shop drawings for all sheet metal fabrications.

.2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.

.3 Submit manufacturer's catalogue cut sheets for manufactured items.

.3 Samples:

.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colour.

1.3 MOCK-UPS

.1 Include flashings in mock-ups as specified for work of other affected sections.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.

Part 2 Products

2.1 BASE SHEET METAL MATERIALS

.1 Aluminum sheet: to ASTM B209 plain AA 3003-H14 alloy AA 5005 alloy anodizing grade, 2.1 mm minimum thickness; finish to match adjacent aluminum framing, unless noted otherwise.

2.2 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Cleats: of same material as sheet metal, continuous lengths, sized to suite application or as detailed.

.3 Flashing screws: 300 series stainless steel, non-corrosive self-tapping, pan head. For fastening to metal.

.4 Fasteners: 'pop' rivets or sheet metal screws of length and thickness suitable for metal flashing application.

.5 Sealant: type 1 as specified in Section 07 92 00.

2.3 FABRICATION

.1 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.1 For aluminum sheet metal flashing, trim and fabrications to be anodized, complete forming prior to anodizing.

.2 Form pieces in 2400 mm maximum lengths.

.1 Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm.

.1 Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

.6 Construct flashing joints to allow for flashing movement. At inside and outside corners, mitre the joint, and use upstanding seams, 25 mm minimum height and 25 mm minimum lap.

.7 Fabricate joints to SMACNA detail J2 (butt and backup plate). Refer to SMACNA Manual Table 3-1.

.8 Maintain 1:5 minimum slope on horizontal surfaces of all flashings, parapets and control joints.

.9 Fit flashings together so that one end of each section is free to move in the joint.

.10 Install flashings free of buckle and warp due to installation methods or dimensional changes due to 100°C temperature range.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install sheet metal work AAI-Aluminum Sheet Metal Work in Building Construction and according to drawings and reviewed shop drawings.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.

.1 Secure in place and lap joints 100 mm.

.2 Provide self-adhesive membrane to tie into adjacent assemblies.

.4 Lock end joints and caulk with sealant.

.5 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.

.6 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 00 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C920-11: Standard Specification for Elastomeric Joint Sealants.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Samples:

.1 Submit 2 samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Ensure that all materials used are compatible.

.2 Declaration of Materials Compatibility: Submit written declaration stating that sealant materials are compatible with adjacent materials and substrates, and that sealant will not stain adjacent stone. Include a list of materials, suppliers and manufacturers.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 5 degrees C.

.2 Joint substrates are dry.

.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Silicone: one component non-staining, silicone sealant to ASTM C920, Type S, Grade NS, Class 50, for Use NT, G, M, A, and O; SWRI validation, shore A hardness of 27 – 35 durometer, non sag, neutral curing.

.2 Polyurethane sealant: paintable, one component polyurethane ASTM C920, Type S, Grade NS, Class 25.

.3 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene, urethane, neoprene or vinyl foam:

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Bond breaker tape:

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. stone): sealant type: silicone.

.2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: sealant type:

.3 Seal interior perimeters of exterior openings as detailed on drawings: sealant type: polyurethane.

.4 Perimeters of interior frames, as detailed and itemized: sealant type: polyurethane.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

.2 Clean adjacent surfaces immediately.

.3 Remove excess and droppings, using recommended cleaners as work progresses.

.4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

1. GENERAL

1.1 Quality Assurance

.1 Fabrication and Installation: Comply with requirements of Canadian Steel Door Manufacturers Association.

.2 Source Limitations: Obtain doors and frames through one source from a single manufacturer.

1.2 Requirements of Regulatory Agencies

.1 Fire Protection Rated Assemblies: Labelled and listed by a nationally recognized testing agency having factory inspection service in conformance with ULC CAN4 S104M and ULC CAN4 S105M for fire protection ratings indicated.

1.3 Submittals

.1 Shop Drawings: Indicate each type of door and frame, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, anchorage to each type of wall opening, arrangement of hardware and fire protection rating.

1.4 Delivery, Storage, and Handling

.1 Brace and protect doors and frames to prevent distortion during shipment. Store in a secure dry location.

.2 Store doors vertically, resting on planks, with blocking between to allow air to circulate.

2. PRODUCTS

2.1 Materials

.1 Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum ZF180 zinc-iron-alloy (galvannealed) coating designation.

.2 Minimum Core Thickness: Metallic coated sheet steel without coating.

.1 Door Frames: 1.519 mm (0.060 inch).

.2 Doors, Face Sheets: 1.519 mm (0.060 inch).

.3 Lock and Strike Reinforcements: 2.66 mm (0.1 inch).

.4 Hinge Reinforcements: 3.416 mm (0.134 inch) thick by 38 mm (1-1/2 inch) wide by 150 mm (6 inch) longer than hinge and pivot, secured by not less than 6 spot welds.

.5 Surface Applied Hardware Reinforcements : 2.66 mm (0.1 inch).

.6 Closer or Holder Reinforcements: 2.66 mm (0.1 inch).

.7 Floor Anchors: 1.6 mm (0.060 inch).

.8 Frame Anchors:

.1 In-Place Masonry/Concrete: 0.912 mm (0.036 inch).

.2 Steel Stud: 0.912 mm (0.036 inch).

.3 Touch-up primer: CAN/CGSB-1.181, Zinc rich primer.

.4 Door Silencers: Single stud rubber/neoprene type

.5 Welding: CSA W59-M.

.6 Filler: Metallic paste, manufacturer's standard.

2.2 Fabrication - General

.1 Blank, reinforce, drill and tap units for mortised, templated hardware, and electronic hardware using templates provided by the hardware suppliers. Reinforce units for surface mounted hardware.

.2 Do welding to CSA W59.

.3 Factory apply touch up primer to doors and frames manufactured from metallic coated steel where coating has been removed during fabrication.

.4 Provide appropriate anchorage to floor and wall construction.

.5 Make provisions in doors and frames to suit requirements of Section providing security devices.

.6 Fabricate fire protection rated assemblies to ULC requirements and bearing ULC, or Warnock-Hersey International Ltd., label, as acceptable to authorities having jurisdiction.

.7 Locate fire protection rating labels on the inside of the frame hinge jamb and door hinge edge midway between the top hinge and the head of the door.

2.3 Fabrication – Frames

.1 Fabricate frames to profiles and maximum face sizes as required to suit design, welded construction.

.2 Cut mitres and joints accurately and weld continuously on inside of frame profile.

.3 Grind welded corners and joints to flat plane, fill with metallic paste filler and sand to uniform smooth finish.

.4 Provide jamb anchors for fixing at floor.

.5 Provide three door silencers on strike jamb for each single door.

2.4 Fabrication – Doors

.1 Doors: Flush, swing type doors with longitudinal edges seamless, vertical rib stiffened, continuously welded, welds ground smooth, filled and sanded flush.

.2 Exterior Building Doors: Shanahan's Steel Stiffened Hollow Metal Door VRS-Series or equivalent, pre-approved by Architect.

3. EXECUTION

3.1 Installation - General

.1 Install fire protection rated assemblies in accordance with NFPA 80.

.2 Touch up with primer galvanized finish damaged during installation.

3.2 Installation - Frames

.1 Set frames plumb, square, level and at correct elevation.

.2 Provide suitable anchors to suit construction. Use one base anchor and two wall anchors per jamb side for frames up to 1500 mm (60 inch) and one additional wall anchor per jamb side for each additional height of 750 mm (30 inch) or fraction thereof.

.1 In-Place Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

.3 Secure anchorages and connections to adjacent construction.

.4 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Remove temporary spreaders after frames are built-in.

.5 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

3.3 Installation - Doors

.1 Provide even clearance, measured from the pull face of doors:

.1 Between Top and Vertical Edges of Door and Frames: 3 mm plus/minus 1.6 mm.

.2 Between Door Bottom of Finished Floor, Fire Protection Rated Assemblies: To NFPA 80 requirements.

.2 Adjust operable parts for correct function.

3.4 Cleaning

.1 Clean and make good all surfaces soiled or otherwise damaged in connection with Work. Upon completion of Work and remove debris, equipment and excess material from Site.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Architectural Manufacturer's Association (AAMA):

.1 AAMA 609/610-15, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

.2 AAMA 611-12, Voluntary Specification for Architectural Anodized Aluminum.

.3 AAMA 701/702-11, Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

1.2 ACTION AND INFORMATION 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 the product to clean doors and frames and include product characteristics, performance criteria and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of aluminum finishes.

1.4 QUALITY ASSURANCE

.1 Perform work of this Section using a company that specializes in the type of aluminum entrance framing work required for this Project, with experience using skilled workers thoroughly experienced in the necessary crafts.

.2 Use manufacturer specializing in the manufacturing of the type of aluminum entrance framing and have the facilities capable of meeting all requirements of the Contract Documents as a single-source responsibility and warranty.

.3 Mock-Ups:

.1 Construct a mock up for a full existing door. Work to be completed on doors and frame, including all fasteners, accessories, seals, glazing and related components. Do not proceed with the rest of the cleaning and repairing of existing aluminum doors and frames until mock-up has been reviewed and found to be in compliance with the performance requirements outlined in this Section.

.2 Prepare the door for cleaning by pulling apart and storing carefully the hardware pieces that are being kept: Hinges, Locks, Cylinders, Flush Bolts, Push Pulls. Clean them separately before reinstalling them. Remove the following hardware pieces that are getting replaced on the doors: Closers, Thresholds, Overhead Stops and Weather Strips.

.3 Provide mock-ups complete, repaired with the products specified in this section and the hardware specified in Section 80 71 00 Door Hardware.

Do not use excessive amounts of sealant, or other special measures or techniques, which are not representative of those to be used in the building. Mock-up(s) will be evaluated for aesthetic acceptability.

.4 Fabricate mock-ups, assembled at the locations where and by the same persons who will perform this work for the project. Perform mock-up installation procedures by the same personnel as those who are intended to perform the work on the project.

.5 Adjust installation methods as required by the Architect until adequate for the site conditions.

.6 The accepted mock-up will become the prototype for all existing aluminium doors and frames on the project and will be the minimum standard in terms of manufacture and installation quality acceptable. The accepted mock-up may be incorporated into the Work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.1 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 Be responsible for the overall adequacy of the cleaning of all aluminum framing, anchors, fasteners, connections, glass, glazing, spandrel panels, caulking, installation and design.

.2 Repair or replace components on which finishes fail within specified warranty period.

.1 Warranty does not include normal weathering.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Make provision to drain, to the exterior, any water entering at joints and/or condensation occurring in the existing doors and doors frames.

.2 Fill and repair all the holes with the specified products in this Section after the removal of the outdated hardware. Leave the surfaces clean and even.

2.2 MATERIALS

.1 Epoxy Putty: BROFIX ALUMINIUM PUTTY REPAINR STICK. Or approved equivalent.

.2 New Door Hardware: as specified in Section 08 71 00.

2.3 FINISHES

.1 Clear anodized finish: Finish to all exposed aluminum surfaces.

.2 Paint ungalvanized steel clips, supports and reinforcing steel with steel primer or bituminous paint.

2.4 HARDWARE

.1 Reinstall existing hardware once cleaned.

.2 Refer to Section 08 71 00 – Door Hardware for new door hardware.

2.5 FABRICATION

.1 Accurately follow the method of construction, reinforcement, anchorage, details of finish, jointing, etc., shown on the reviewed shop drawings.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for aluminum doors and frames installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry, with bituminous paint.

.3 Set doors and frames plumb, level and true to line, in alignment with existing, free of warp, twisting or wracking and superimposed loads.

.4 Anchor frames solidly and accurately to surrounding construction using concealed fasteners, in designed location, in manner not restricting thermal movement. Lock settings after alignment.

.5 Install galvanized steel reinforcement to aluminum framing as required to accommodate all superimposed loading and as indicated on the reviewed shop drawings and as required.

.6 Supply and install all necessary aluminum sheet brake shapes and flashing required to complete the installation. Install flashing at the head of all aluminum entrances and elsewhere as required to provide a weather tight installation. Match the finish and colour

of the extruded sections.

.7 Adjust doors and hardware in accordance with hardware templates and manufacturer's directions, for smooth operation and to be weather tight when closed. Adjust operable parts for correct function.

.8 Install hardware on aluminum doors to locations indicated on the reviewed shop drawings and as accepted by the Consultant. Fit finish hardware neatly, accurately; make plumb and level with proper clearance for correct operation.

.9 Ensure that the completed installation is free from objectionable noise, rattles, wind whistles and noise due to thermal movement.

.10 Install sealant and related materials for perimeter of frame and between members of aluminum work to provide weather tight seal at outside.

.11 Apply sealant in accordance with Section 07 90 00 - Sealants. Conceal sealant within the aluminum work except where exposed use is permitted.

3.3 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract upon completion.

.2 Manufacturer's Field Services: 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.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

.2 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.4 Clean aluminum with damp rag and approved non-abrasive cleaner.

.5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

3.5 PROTECTION

.1 Repair damage to adjacent materials caused by aluminum door and frame installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Aluminum Association (AA):

.1 Aluminum Design Manual, 2010.

.2 Welding Aluminum: Theory and Practice, 2002.

.3 Properties of Aluminum Alloys: Tensile, Creep, and Fatigue Data at High and Low Temperatures, 1999.

.2 American Architectural Manufacturer's Association (AAMA):

.1 AAMA 609/610-15, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

.2 AAMA 611-12, Voluntary Specification for Architectural Anodized Aluminum.

.3 AAMA 701/702-11, Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

.3 ASTM International (ASTM):

.1 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.

.3 ASTM F1941/F1941M-16, Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric.

.4 Canadian Standards Association (CSA):

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

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

1.2 ACTION AND INFORMATION 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 doors and frames and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Clearly indicate, by large scale details, all perimeter conditions of construction, mullion details, head and sill details, threshold, jamb details including at segmented framing, all components of assembly, anchorage sealing techniques, tolerances of openings, elevations, hardware locations and mounting heights and all materials and finish.

.2 Submit detailed shop drawings for each opening: Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.

.3 Do not proceed with fabrication until shop drawings have been accepted and returned, and all hardware locations have been confirmed.

.4 Door sizes listed in door schedule are nominal sizes only; make all necessary allowances for clearances.

.5 Check types and items listed or suitability to doors, door swing and hardware function.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.4 QUALITY ASSURANCE

.1 Perform work of this Section using a company that specializes in the type of aluminum entrance framing work required for this Project, with experience using skilled workers thoroughly experienced in the necessary crafts.

.2 Use manufacturer specializing in the manufacturing of the type of aluminum entrance framing specified in this Section and have the facilities capable of meeting all requirements of the Contract Documents as a single-source responsibility and warranty.

.3 Use installers trained and approved by the aluminum framing system manufacturer.

.4 Obtain all aluminum framing components through one source from a single manufacturer.

.5 Manufacturer's identifications, such as labels and name plates visible on the finished work are not permitted.

.1 Evidence of patching after removal of tags is not permitted.

.6 Mock-Ups:

.1 Construct a mock up of entrance door complete with side light, including all necessary fasteners, accessories, seals, glazing and related components. Do not proceed with the rest of the installation or fabrication of aluminum framing until mock-up has been reviewed and found to be in compliance with the performance requirements outlined in this Section.

.2 Provide mock-ups complete with corners, splice joints, gaskets, air/vapour seals, accessories, fasteners, sealants, glass and glazing, anchors, and related components, and details identical to those proposed for use in the building. Do not use excessive amounts of sealant, or other special measures or techniques, which are not representative of those to be used in the building. Mock-up(s) will be evaluated for aesthetic acceptability as well as for compliance with specified performance criteria.

.3 Fabricate mock-ups, assembled and glazed at the locations where and by the same persons who will perform this work for the project. Perform mock-up installation procedures by the same personnel as those who are intended to perform the work on the project.

.4 Adjust installation methods as required by the Consultant until adequate for the site conditions.

.5 The accepted mock-up will become the prototype for all framing on the project and will be the minimum standard in terms of manufacture and installation quality acceptable. The accepted mock-up may be incorporated into the Work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Use easy to remove, residue free coatings.

.2 Leave protective covering in place until final cleaning ofbuilding.

.3 Store materials in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.4 Store and protect aluminum doors and frames from nicks, scratches, and blemishes.

.5 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 Be responsible for the overall adequacy of all aluminum framing, including aluminum work, anchors, fasteners, connections, glass, glazing, spandrel panels, caulking, installation and design.

.2 Comply with General Conditions. Provide five (5) year Systems Warranty commencing on the date of Substantial Performance of the Work, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:

.1 Abnormal deterioration, aging or weathering of the Work.

.2 Failure of anchorage metals due to oxidation, electrolytic damage and deterioration of protective coatings.

.3 Loose or missing parts.

.4 Failure of operating and moving parts and components to function properly.

.5 Leakage of water or air exceeding specified limits.

.6 Failure of tapes, gaskets or sealants.

.7 Glass breakage, due to design faults or improper installation.

.8 Failure to conform to profiles, locations, arrangements shown on drawings.

.9 Failure to conform to manufacturer's recommendations and industry standards as they apply to the various curtain wall components.

.10 Staining of curtain wall surfaces caused by incompatibility of adjacent materials.

.11 Objectionable appearance or performance resulting from either defective or nonconforming materials or workmanship.

.12 Structural failure.

.13 Loss of glass bite due to shifting of glass.

.14 Loss of glass bearing on setting blocks due to shifting of glass and/or blocks.

.15 Collapse of thermal insulation or shifting insulation.

.3 Repair or replace components on which finishes fail within specified warranty period.

.1 Warranty does not include normal weathering.

.2 Warranty Period: 15 years from date of Substantial Performance of the Work.

.4 Glass and Glazing Warranty: Submit in accordance with Section 08 80 00 warranties for glass products from glass unit supplier will be passed on to the Owner.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Provide framing members with a thermal break so that under the following environmental conditions no condensation on the interior metal will occur:

.1 20 degrees C interior, -25 degrees C exterior, 25 km/h wind, 25 % R.H.

.2 Ensure that no condensation forms on any interior surfaces of aluminum members before the exposed area of the sealed unit reaches the dew-point temperature.

.2 Provide testing to indicate resistance to corner racking, using the Dual Moment Load test as follows:

.1 Test section to consist of a standard top door corner assembly, with 600 mm long side rail section and 300 mm long top rail section.

.2 Anchor top rail positively to test bench so that corner protrudes 75 mm beyond bench edge.

.3 Anchor a lever arm positively to side rail at a point 475 mm from inside edge of top rail. Attach weight support pad at a point 475 mm from inner edge of side rail.

.4 Test section must withstand a load of 122.5 kg on lever arm before reaching point of failure. Point of failure will be when a rotation of the lever arm is in

excess of 45°.

.3 Air Infiltration: applies only to single acting offset pivot or butt hung doors

.1 Test air infiltration in accordance with ASTM E283, at a pressure difference of 75 Pa.

.2 A single (914.4 mm x 2133.6 mm) entrance door and frame and does not exceed 2.78 m^3 /h•m.

.3 A pair of (1828.8 mm x 2133.6 mm) entrance doors and frame and does not exceed 5.56 m^3 /h•m.

.4 Make provision to drain, to the exterior, any water entering at joints and/or condensation occurring within the wall construction.

.5 Submit certificates of tests performed and compliance with the specified design criteria.

2.2 MATERIALS

.1 Aluminum Extrusions: AA6063-T54 or T6 alloy.

.2 Sheet aluminum: Aluminum Association alloy AA1100-H14. 2.1 mm thickness to brake shapes, closures and trim unless noted otherwise.

.3 Glazing: as specified in Section 08 80 00.

.4 Fasteners:

.1 In contact with aluminum: cadmium plated steel, finish conforming to ASTM F1941, Class 5C, or aluminum, finish to match framing.

.2 In contact with steel: zinc plated steel, finish conforming to ASTM B633, Type LS.

.3 Exposed fasteners where permissible: aluminum, finish to match framing.

.5 Glass settings and Gaskets: resilient type as recommended by the door manufacturer, suitable for receiving glazing as specified in Section 08 80 00.

.6 Anti-Rotational Channels: aluminum or PVC channels, minimum 2.1 mm wall thickness, of size to suit glazing rabbet to storefront framing, one length piece per location.

.7 Door bumpers: black neoprene.

.8 Weatherstripping (to exterior doors): Manufacturer's standard weatherstripping woven pile conforming to AAMA 701.1 or waterproof, rot-proof pile fibre 4 mm high x 6 mm wide in neoprene backing of flexible vinyl at heads, jambs, and on sweeps at door bottoms.

.9 Isolation coating: alkali resistant bituminous paint.

.10 Steel reinforcements and anchor plates: to CAN/CSA G40.21, Grade 300W, galvanized after fabrication with minimum Z275 designation to ASTM A653. Provide continuous 2.7 mm thick steel backup plate to hinges.

.11 Door bottom seal: adjustable door seal of anodized extruded aluminum frame (colour to match door) and vinyl weather seal.

2.3 ALUMINUM DOORS

.1 Construct doors of porthole extrusions with minimum wall thickness of 3 mm.

.2 Door stiles nominal 89 mm wide plus or minus 6 mm.

.3 Top rail nominal 89 mm wide plus or minus 6 mm.

.4 Bottom rail nominal 165 mm wide plus or minus 6 mm.

.5 Reinforce mechanically-joined corners of doors by welding and spigotting of one piece cast aluminum angle to produce sturdy door unit resistant to wracking.

.6 Provide weatherstripping on two sides and head of exterior doors and sweep strip full width of bottom rail. Construct to permit ready placement of weatherstripping on installed doors without special tools.

.7 Glazing stops: interlocking snap-in type for dry glazing. Design and make exterior stops tamper proof type.

.8 Doors: non-thermally broken doors, bevelled stops interlocking snap-in type for dry glazing, tamper proof type to exterior doors, standard head and bottom rails and bevelled stiles.

2.4 FRAMES

.1 Thermally Broken Framing: frames of aluminum extrusions with minimum wall thickness of 3 mm; flush stops.

.2 Install vertical mullions continuous. Provide one-piece sills or flush jointed on mullion centreline with alignment spline.

.3 Provide for adequate clearance and shim space at perimeter of opening.

.4 Provide weepholes in horizontal members of exterior frames and screens. Drain weepholes to exterior.

2.5 FINISHES

.1 Clear anodized finish: Finish to all exposed aluminum surfaces: Clear anodized finish, Class I anodic coating conforming to AAMA 611: AA-M10C22A41 specification; minimum 0.18 mm thickness.

.2 Shop apply strippable protective covering to finished aluminum surfaces until completion of the work.

.3 Paint ungalvanized steel clips, supports and reinforcing steel with steel primer or bituminous paint.

2.6 HARDWARE

.1 Provide the following hardware items matching existing hardware on the Project and submit Shop Drawings for review:

.1 Hinges.

.2 Locks, keyed to match existing.

.3 Cylinders.

.4 Flush bolts.

.5 Push/Pulls.

.6 Closers.

.7 Thresholds.

.8 Overhead stops.

.9 Weather strip.

2.7 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Check and confirm site dimensions prior to preparation of shop drawings. Fabricate work to suit site dimensions.

.3 Provide adequate gauges of metal and methods of construction and reinforcement to meet site conditions, with the requirements of the Consultant's details and specifications as a minimum. Reinforce framing as required to withstand all superimposed loading.

.4 Accurately follow the method of construction, reinforcement, anchorage, details of finish, jointing, etc., shown on the reviewed shop drawings.

.5 Fabricate units where practical in shop, in accordance with the details and reviewed shop drawings. Build units square, true, accurate to size, free from distortion, waves, twists, buckles or other defects detrimental to appearance and performance.

.6 Fabricate metal components of sharply and well-defined profiles and of gauges and thicknesses not less than those indicated and/or required.

.7 Fit and assemble in the shop, units too large for handling or shipping to check accuracy, disassembled and marked for shipping and field assembly.

.8 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 12 mm bite for insulating glazed units and single glazing.

.9 Neatly and accurately brake form all aluminum flashings, brake shapes, closures and trim as detailed on the drawings and reviewed shop drawings.

.10 Refer to Section 07 60 00 for additional requirements for flashings.

.11 Accurately fit intersecting members to flush hairline, weather-tight joints and mechanically interlock together, except where specified or detailed otherwise.

.12 Fabricate segmented interior framing to smooth uniform curvature as indicated.

.13 Manufacturer's identifications, such as labels and name plates visible on the finished work are not permitted.

.14 Unless otherwise noted, provide concealed fastenings throughout.

.15 Make allowance for deflection of structure to ensure that structural loads are not transmitted to framing or glazing. Fabricate deflection heads to aluminum framing as detailed on the drawings and reviewed shop drawings.

.16 Fit joints tightly and secure mechanically.

.17 Conceal all fasteners.

.18 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware.

.19 Provide resilient settings for all glass, with through sight lines and no projecting stops.

.20 Finish steel clips and reinforcing steel with zinc coating to CAN/CSA G164.

.21 Fabricate framing to withstand all superimposed loading.

.22 Provide all rough-in to accommodate barrier free operators.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for aluminum doors and frames installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install aluminum framing and interior and exterior doors in accordance with the manufacturer's recommendations and reviewed shop drawings.

.3 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry, with bituminous paint.

.4 Set doors and frames plumb, level and true to line, in alignment with adjacent work, free of warp, twisting or wracking and superimposed loads.

.5 Anchor frames solidly and accurately to surrounding construction using concealed fasteners, in designed location, in manner not restricting thermal movement. Lock settings after alignment.

.6 Brace frames rigidly for building-in. Install temporary horizontal wood spreaders at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders and supports after frames are built-in.

.7 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

.8 Install galvanized steel reinforcement to aluminum framing as required to accommodate all superimposed loading and as indicated on the reviewed shop drawings and as required.

.9 Supply and install all necessary aluminum sheet brake shapes and flashing required to complete the installation. Install flashing at the head of all aluminum entrances and elsewhere as required to provide a weather tight installation. Match the finish and colour of the extruded sections.

.10 Adjust doors and hardware in accordance with hardware templates and manufacturer's directions, for smooth operation and to be weather tight when closed. Adjust operable parts for correct function.

.11 Install hardware on aluminum doors to locations indicated on the reviewed shop drawings and as accepted by the Consultant. Fit finish hardware neatly, accurately; make plumb and level with proper clearance for correct operation.

.12 Coordinate installation of access control system on aluminum doors where indicated.

.13 Ensure that the completed installation is free from objectionable noise, rattles, wind whistles and noise due to thermal movement.

.14 Protect aluminum and glass surfaces until final cleaning.

.15 See Section 08 80 00 for glazing requirements, and install in accordance with manufacturer's directions and in accordance with reviewed shop drawings.

.16 Install sealant and related materials for perimeter of frame and between members of aluminum work to provide weather tight seal at outside.

.17 Apply sealant in accordance with Section 07 90 00 - Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Consultant.

3.3 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's Field Services: 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:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends completed, but before installation begins.

.2 During progress of Work at and 60% complete.

.3 Upon completion of Work, after cleaning carried out.

.4 Obtain reports within 3 days of review and submit.

3.4 FIELD TESTING

.1 Selected installed fenestration products shall be tested for water penetration resistance in accordance with ASTM E1105. The test Procedure shall correspond to the method of test used to qualify the product for water penetration resistance under AAMA/WDMA/CSA101/I.S.2/A440. The water penetration test pressure shall be as indicated in this specification. The test chamber shall be installed so as to test both the product and the interface joint to the adjacent wall. The pass/fail criteria for the test shall be as defined in CSA A440S1 Clause 5.4.

.2 The minimum number of products selected for field testing are shown below.

TOTAL NUMBER OF PRODUCTS	PRIOR TO 5% INSTALLED	AT 50% INSTALLED	AT 100% INSTALLED
0-25	**1**	**0**	**0**
25-100	**1**	**0**	**0**
100-200	**2**	**1**	**0**
>200	**3**	**2**	**2**
*Windows, sliding doors and side hinged doors shall be field tested as shown in this table according to the quantity of each on the project.			

.3 Where modifications are necessary to the window assembly or wall interfaces to achieve the required performance, the contractor shall undertake required modifications to the manufacturing or installation process to the satisfaction of the Building Envelope Consultant. This Consultant is to ensure that the required modifications in this process do not void or compromise the manufacturer’s warranty.

.4 Include cost of field testing in the contract price. The Contractor will pay for any re- testing required as a result of failures. For renovation projects, the Owner may choose to have the consultant to engage the testing firm independently.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

.2 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.4 Clean aluminum with damp rag and approved non-abrasive cleaner.

.5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.6 Clean glass and glazing materials with approved non-abrasive cleaner.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by aluminum door and frame installation.

END OF SECTION

Part 1 General

1.1 **RELATED REQUIREMENTS**

.1 Section 02 41 00.08 Demolition Minor Works
.2 Section 02 41 19 Selective Demolition
.3 Section 03 30 00 Concrete Grout/Patching
.4 Section 04 03 43.19 Period Stone Dismantling
.5 Section 04 05 00 Common Work Results for Masonry
.6 Section 04 05 13 Masonry Mortaring and Grouting
.7 Section 08 80 00 Glazing

1.2 **REFERENCE STANDARDS**

.1 BC Building Code 2018, BC Energy Efficiency Standards Regulation, and Local Government Act.

.2 Aluminum Association (AA)

.1 AA DAF 45OL-[03(R2009)], Designation System for Aluminum Finishes.

.3 ASTM International (ASTM)

.1 ASTM A 123/A 123M-[15], Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.

.2 ASTM E 1105, Field Determination of Water Penetration of Installed Exterior Curtain Walls and Doors, by Uniform or Cyclic Static Air Pressure Difference.

.3 ASTM E 1748-[95(2009)], Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.4 ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.

.4 CSA Group (CSA)

.1 CSA A440S1, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.

.2 CAN/CSA-A440.2-[14]/A440.3-[14], Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.

.3 CAN/CSA-A440.4, Window, Door, and Skylight Installation

.4 CAN/CGSB-12.20 Structural Design of Glass for Buildings.

1.3 **PRE-CONSTRUCTION MEETINGS**

.1 Convene both a pre-demolition and a pre-construction meeting 1 week prior to beginning work of this Section for demolition and construction, respectively, with Contractor's Representative, installer’s representative, Departmental Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other construction subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

1.4 **PERFORMANCE REQUIREMENTS**

.1 Windows, side hinged doors shall conform to AAMA/WDMA/CSA101/I.S.2/A440 and CSA A440S1, and have the following minimum tested performance ratings:

.1 Performance Grade – For Part 3 buildings the architect may determine Performance Grades that will be used together with Performance Class to prequalify and select products. Performance Grade shall not be less than PG35.

.2 Water Penetration Resistance Test Pressure – to be determined in accordance with CSA A440S1, but in no case shall it be less than 290 Pa for buildings up to four storeys. Lower requirements shall require BC Housing and Consultant's approval.

.3 Air infiltration/Exfiltration Level: A03 for operable windows; "fixed" for non-operable windows.

.2 Insulating glass units shall be of dual seal construction certified for durability and argon gas retention to ASTM E2190.

Fenestration products shall be labeled to show an overall product U-value of 1.8 W/m2-K or less as required by the BC Energy Efficiency Standards Regulation and depending on BC Housing energy target for that climate zone. U-value labels shall bear the mark of a recognized certification agency.

.3 Fenestration products shall comply with the Canadian Operating Force Requirements in AAMA/WDMA/CSA 101/I.S.2/A440.

.4 Paints, coatings, adhesives and sealants must not contain methylene chloride and perchloroethylene. Paints and coatings must meet Canadian Volatile Organic Compound (VOC) Concentration Limits for Architectural Coating Regulations (SOR/2009-264). Adhesives and sealants must meet SCAQMD Rule 1168, effective July 1, 2005.

.5 All windows are to have a SHGC of 0.35 or lower. Windows with high exposure to summer sun can be considered at 0.25 or lower.

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 windows and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29 - Health and Safety Requirements.

.3 Submit written evidence of insulating glass certification to ASTM E 2190. The certification must apply to the insulating glass makeup used in the fenestration products.

.4 Submit certified copies of test results from an approved independent testing agency to confirm compliance with minimum specified AAMA/WDMA/CSA101/I.S.2/A440 Performance Class and Grade.

.5 Shop Drawings: For window indicated to comply with performance requirements and design criteria.

.1 Apply signature and sealed by a qualified professional engineer responsible for their preparation, and who is licensed in the Province where the Project is located.

.2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components, fasteners, and caulking. Indicate location of manufacturer's nameplates.

.3 Indicate design loads, frame reinforcing, insulating glass makeup, installation clearances, expected building deformations, as well as shimming and anchorage requirements for the expected design load for that location.

.4 Indicate locations, dimensions, openings and requirements of related work.

.5 Shop drawings may be used to report the AAMA/ WDMA/ CSA101 /I.S.2 /A440 Performance Class, Performance Grade, Water penetration Resistance Test Pressure, and Air Infiltration/Exfiltration Level of the fenestration which products in place of individual labels applied to the products. It is understood that the engineer’s seal on the shop drawings does not constitute an endorsement or certification of the AAMA/WDMA/CSA101/I.S.2/A440 performance information.

.6 Submit Schedule S-B Assurance of Design and Schedule S-C Assurance of Field Review for fenestration product design and anchoring on completion of the installation.

.6 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit one representative model, complete full-size window sample of each type window.

.3 Include frame, sash, sill, glazing and weatherproofing method, surface finish and hardware. Show location of manufacturer's nameplates.

.4 Include 150 mm long samples of head, jamb, and sill to indicate profile

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.7 QUALITY ASSURANCE

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

.2 Mock-Up:

.1 Provide site mock-up for work of this Section indicating methods and materials, and procedures proposed to achieve final results in accordance with Section 01 45 00 – Quality Control.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect windows from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.9 WARRANTY

.1 Manufacturer's warranty: Submit manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights Owner may have under Contract Documents.

.2 Sealed units to have a minimum warranty period of twenty 20 years against failure of glazing unit seals and deposits on interior glass faces detrimental to vision.

.3 Fenestration product frames to have a minimum warranty period of 25 years against failure of frame, sash and mullions. Failure modes include:

.1 Warping

.2 Cracking

.3 Shrunken glazing beads

.4 Failure of gaskets

.5 Dislocation or disappearance of weather strips

.6 Detectable water penetration through joints in the product

.7 Operational difficulties such as inability or increased difficulty to operate products, including an increase in operating force beyond the values in AAMA/WDMA/CSA101/I.S.2/A440 Table 6.

.4 Hardware to have a minimum warranty period for 10 years against breakage; premature wear and/or operational difficulties such as inability or increased difficulty to operate products, including an increase in operating force beyond the values in AAMA/WDMA/CSA101/I.S.2/A440 Table 6.

Part 2 Products

2.1 ACCEPTED MANUFACTUER

.1 Oldcastle Building Envelope: Series 3000 Thermal MultiPlane.

.2 Or approved equivalent.

2.2 MATERIALS

.1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 Windows by same manufacturer.

.3 Sash: Aluminum anodized.

.4 Main frame: Aluminum anodized.

.5 Glass: in accordance with Section 08 80 50 - Glazing.

.6 Isolation coating: alkali resistant bituminous paint.

.7 Sealants: to Section 07 92 00

2.3 FLASHINGS

.1 24 gauge minimum base metal thickness, Z275 designation, zinc-coated steel confirming to ASTM A652/A642M, Grade A, prefinished to match window frames.

2.4 WINDOW TYPE AND CLASSIFICATION

.1 Product types:

.1 C - Casement window.

.2 FW- Fixed window.

.2 Classification rating: to AAMA/WDMA/CSA 101/I.S.2/A440.

.1 Primary designation:

.1 Performance classes: CW.

.2 Performance categories: minimum PG30.

.2 Secondary designation:

.1 Positive design pressure: 1440 Pa.

.2 Negative design pressure: 1440 Pa.

.3 Water penetration resistance test pressure: 220 Pa.

.4 Canadian air infiltration and exfiltration levels: Fixed.

.3 Surface condensation control: compliant with standard CAN/CSA-A440.2/A440.3.

.4 Forced Entry: F1, Comply with AAMA/WDMA/CS101/I.S.2/A440.

.5 Ancillary properties (Energy rating).

.1 Overall coefficient of heat transfer (U-factor) 1.8 W/(m^2.K) or less

.2 Solar heat gain coefficient (SHGC) 0.35 or lower, or 0.25 or lower for windows with high exposure to summer sun.

.3 Visible transmittance (VT) 0.36

2.5 FABRICATION

.1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less, and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

2.6 ALUMINUM FINISHES

.1 Aluminum finishes: to match as closely as possible the existing products, as follows:

.1 Interior: Anodized.

.2 Exterior: Anodized.

2.7 GLAZING

.1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

.1 Section 08 80 00.

.2 Privacy glazing

.1 Privacy glazing as per section 08 80 00, article 2.2.3.

.2 Exterior of pane of Insulated Sealed Units shall be privacy glazing where noted on the drawings. Contractor to coordinate with Window and Glazing manufacturer.

2.8 HARDWARE

.1 Hardware: stainless steel sash locks and aluminum handles to provide security and permit easy operation of units.

.2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.

.3 Include special keyed opening device for windows normally locked.

2.9 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:

.1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.

.2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

2.10 WINDOW BLINDS

.1 Description: Horizontal slat louvres hung from full-width headrail with full-width bottom rail.

.2 Blinds: Manual control of raising and lowering by cord with full range locking. Blade angle adjustable by control wand; complying with ANSI/WCMA A100.1

.3 Slats: PVC slats with wood veneer finish; square slat corners.

.1 Width: TBD

.2 Thickness: TBD

.3 Color: TBD

.4 Slat Support: Woven polypropylene cord, ladder configuration.

.5 Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats. Color: Black.

.6 Bottom Rail: Pre-finish, Black, formed aluminum box with top side shaped to match slat curvature; with end caps. Color: Black.

.7 Control Wand: Extruded solid plastic; hexagonal shape.

.1 Non-removal type.

.2 Length of window opening height less 3 inches.

.8 Headrail Attachment: Wall backets.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

.1 Window installation:

.1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 and CAN/CSA-A440.4.

.2 Arrange components to prevent abrupt variation in colour.

.3 Make sure the window product and installation detail maintains the continuity on thermal protection, air barrier and overall building envelope.

.4 Correctly locate and install flashings, deflectors and weep holes to ensure proper drainage of moisture to exterior. Provide flashing with end dams over window heads and sill flashing with end dams at window sills. Slope sills and sill flashing to the outside.

.5 Do not block or seal fenestration product weep holes.

.2 Sill installation:

.1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece at each location.

.2 Cut sills to fit window opening.

.3 Secure sills in place with anchoring devices located at ends joints of continuous sills and evenly spaced 600 mm on centre in between.

.4 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.

.5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

.3 Caulking:

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted.

3.3 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and site visits for inspection of product installation in accordance with manufacturer's instructions. Manufacturer to provide field service upon first instance of product installation and upon completion of all instances.

3.4 FIELD TESTING

.5 Selected installed fenestration products shall be tested for water penetration resistance in accordance with ASTM E1105. The test Procedure shall correspond to the method of test used to qualify the product for water penetration resistance under AAMA/WDMA/CSA101/I.S.2/A440. The water penetration test pressure shall be as indicated in this specification. The test chamber shall be installed so as to test both the product and the interface joint to the adjacent wall. The pass/fail criteria for the test shall be as defined in CSA A440S1 Clause 5.4.

.6 The minimum number of products selected for field testing are shown below.

TOTAL NUMBER OF PRODUCTS	PRIOR TO 5% INSTALLED	AT 50% INSTALLED	AT 100% INSTALLED
0-25	1	0	0
25-100	1	0	0
100-200	2	1	0
>200	3	2	2
*Windows, sliding doors and side hinged doors shall be field tested as shown in this table according to the quantity of each on the project.			

.7 Where modifications are necessary to the window assembly or wall interfaces to achieve the required performance, the contractor shall undertake required

modifications to the manufacturing or installation process to the satisfaction of the Building Envelope Consultant, to be hired by the Contractor. This Consultant is to ensure that the required modifications in this process do not void or compromise the manufacturer's warranty.

.8 Include cost of field testing in the contract price. The Contractor will pay for any re-testing required as a result of failures. For renovation projects, the Owner may choose to have the consultant to engage the testing firm independently.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)

.1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.

.2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.

.3 ANSI/BHMA A156.3-2001, Exit Devices.

.4 ANSI/BHMA A156.18-2006, Materials and Finishes.

.5 ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:

.1 Submit contract hardware list.

.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

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

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

.7 Submit proposed locations for install for neoprene weatherstripping seals on existing doors to cover cracks and gaps as shown on drawings, including:

.1 Door: head / jamb / sweep locations

.2 Side of door of seal installation: interior / exterior

.8 Submit proposed scheme for new electrical routing to support barrier free operators.

.9 Submit proposed scheme for installation of new barrier free operators.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 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 door hardware from nicks, scratches, and blemishes.

.3 Protect prefinished surfaces with strippable coating.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 HARDWARE GENERAL REQUIREMENTS

.1 Use one manufacturer's products only for similar items.

.2 Provide door hardware specified in this section.

.3 Door hardware to match existing as closely as possible in finish and style.

.4 Locks and latches:

.1 Bored and preassembled locks and latches: to ANSI/BHMA A156.2, series 2000 preassembled lock, grade 1, designed for function and keyed as stated in Hardware Schedule.

.2 Escutcheons: match existing.

.3 Normal strikes: box type, lip projection not beyond jamb.

.4 Cylinders: key into keying system as noted.

.5 Butts and hinges:

.1 Butts and hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.

.6 Exit devices: to ANSI/BHMA A156.3.

.7 Door bumpers: black neoprene.

.8 Isolation coating: alkali resistant bituminous paint.

.9 Steel reinforcements and anchor plates: to CAN/CSA G40.21, Grade 300W, galvanized after fabrication with minimum Z275 designation to ASTM A653. Provide continuous 2.7 mm thick steel backup plate to hinges.

.11 Door bottom seal: adjustable door seal of anodized extruded aluminum frame (colour to match door) and vinyl weather seal.

.12 Door closer: To match as closely the existing.

2.2 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware and existing door and frame.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.3 KEYING

.1 Prepare detailed keying schedule.

.2 Coordinate keying requirements. Doors to be keyed to match the scheme of existing doors and locks.

.3 Supply construction cores.

.4 Hand over permanent cores and keys.

2.4 WEATHERSTRIPPING

.1 NEW DOORS: Weatherstripping (to exterior doors): Manufacturer's standard weatherstripping woven pile conforming to AAMA 701.1 or waterproof, rot-proof pile fibre 4 mm high x 6 mm wide in neoprene backing of flexible vinyl at heads, jambs, and on sweeps at door bottoms.

.2 EXISTING DOORS:

.1 Neoprene Perimeter Seals: Single fin. Anodized aluminum flange and black neoprene insert. Total profile length including aluminum and neoprene to be no longer than 1 1/4 Inch. Withstand temperatures from -40 deg c to 93 deg C. Black neoprene insert maximum 3/16” thick.

.2 Neoprene Astragal Seals: Single fin. Anodized aluminum flange and black neoprene insert. Total profile length including aluminum and neoprene to be no longer than 1 ½”. Withstand temperatures from -40 deg c to 93 deg C. Black neoprene insert maximum 3/16” thick.

.3 Approved alternative.

.4 Submit locations requiring neoprene seals as part of submittals in article 1.2.7.

2.5 AUTOMATIC DOOR OPERATOR

1. Contractor to provide shop drawing for proposed electrical routing to support automatic door operator. Coordinate with Consultant for the routing of new electrical connections to respect heritage features of the building.
2. Design Requirements:
    1. Refurbish existing doors with new automatic operator equipment as indicated on drawings, and to comply with NBC 2015.
    2. Design new automatic entrance doors as indicated on drawings, and to comply with NBC 2015.
    3. Automatic entrances to comply with applicable requirements of ANSI/BHMA A156.10.
3. Performance Requirements:
    1. Operator Equipment: CSA Approved
    2. Design swinging doors system to operate, hold open and close under design wind and section loads, as calculated in accordance with BCBC 2018.
    3. Supply manual operation for opening and closing of doors during electrical power failure and when power is manually switched off.
4. Automatic Door Operator Equipment:
    1. Contractor to submit shop drawings for proposed system to provide automatic door action pertaining to each door requiring automatic operator, as permitting of each door opening's different structural and visual characteristics. Preference will be given to systems which:
        1. Are concealed or are visually unobstructive.
        2. Match the existing aluminum or painted finish of door.
5. Door operator control systems
    1. All control systems to be touch/push button devices. Contractor to submit shop drawings for proposed location of touch/push button device. The touch/push button location shall conform to NBC 2015 and can be located:
        1. On a existing adjacent surface or,
        2. On a guide rail matching the appearance and finish of existing aluminum doors, or
        3. Approved alternative
6. Guide Rails:
    1. Aluminum bar stock sections, of same lengths as width of door leaf, free standing, floor mounted.
    2. Equip rails with polycarbonate plastic sheet infill, clear.
    3. Finish rails to match door framing.
7. Door Signs:
    1. Sign Material: self adhesive type for mounting on glass.
    2. Include arrow sign on approach side of power operated swinging doors; green circle surrounding black arrow on white background, to ANSI/BHMA A156.10.
    3. Include "CAUTION – AUTOMATIC DOOR" sign on approach side of power operated swinging doors serving two-way traffic; yellow circle with black letters except the word "CAUTION" (yellow letters on black background,) design and mounting location to ANSI/BHMA A156.10
    4. Include "IN EMERGENCY PUSH TO OPEN" and « EN CAS D'URGENCE, POUSSER POUR OUVRIR » sign on power operated in-swinging doors with manual

swing-out emergency release; red background with contrasting letters, design and mounting location to ANSI/BHMA A156.10, interior side.

8. Field Quality Control
   1. Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its product[s], and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.
   2. Manufacturer's Field Services: submit 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. Ensure manufacturer's representative is present before and during critical periods of installation.
   4. Schedule site visits to review Work at stages listed:
      1. After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
      2. Upon completion of Work, after cleaning is carried out.
9. Adjusting
   1. After repeated operation of completed installation equivalent to three days of use by normal traffic (100 to 300 cycles), readjust door operators and controls for optimum, smooth operating condition and safety [and for weather tight closure]. Lubricate hardware, operating equipment and other moving parts.
   2. Adjust revolving doors to ensure tight fit at contact points with enclosure.

Part 3 Execution

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Co-ordinate installation of components with related and adjacent work.

.3 Install door operator system in accordance with manufacturer's instructions, including controls, control wiring.

.4 Set tracks, header assemblies, operating brackets, rails and guides level and true to location, with adequate anchorage for permanent support.

.5 Supply manufacturers' instructions for proper installation of each hardware component.

.6 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.7 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.8 Install key control cabinet.

.9 Use only manufacturer's supplied fasteners.

.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.10 Remove construction locks when directed.

.1 Install permanent cores and ensure locks operate correctly.

.11 Insure electrically activated hardware components are coordinated with general contractor.

3.2 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware existing and new, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.3 Remove protective material from hardware items where present.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.4 DEMONSTRATION

.1 Maintenance Staff Briefing:

.1 Brief maintenance staff regarding:

.1 Proper care, cleaning, and general maintenance of projects complete hardware.

.2 Description, use, handling, and storage of keys.

.3 Use, application and storage of wrenches for locksets.

.2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by door hardware installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM C509-06(2015): Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.

.2 ASTM C864-05(2015): Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

.3 ASTM C1115-06(2011): Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.

.4 ASTM C1330-02(2013): Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

.5 ASTM D395 - 16e1: Standard Test Methods for Rubber Property—Compression Set.

.6 ASTM E2190-02; Standard Specification for Insulating Glass Unit Performance and Evaluation.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1-M90: Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.8-97: Insulating Glass Units.

.3 CAN/CGSB-12.13-M91: Patterned Glass.

.3 Consumer Product Safety Commission (CPSC)

.1 16 CFR 1201: Safety Standard for Architectural Glazing Materials.

.4 Flat Glass Manufacturers Association (FGMA):

.1 FGMA Glazing Manual - 1997.

.5 Insulated Glass Manufacturer's Association of Canada (IGMAC).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate samples, 300 mm x 300 mm of each type of sealed unit.

.2 Submit duplicate samples of each type of glazing accessory.

.4 Glass and Glazing Documentation:

.1 Prepare and have approved by glass manufacturer to include but not be limited to locations and types of glass, windload requirements, thermal stress requirements,

safety glass locations, compliance with specified and applicable codes, and Contract Documents.

.2 Contractor is responsible for verifying the glass types and locations of installation are in compliance with "Glass and Glazing Documentation" prepared and approved by glass manufacturer.

.3 Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

.4 For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

.5 Submit documentation verifying existing glazing types used in windows not in contract, and verification whether identical glazing can be employed in new windows and doors.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

1.6 AMBIENT CONDITIONS

.1 Ambient Requirements:

.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

Part 2 Products

2.2 MATERIALS

.1 Design Criteria:

.1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:

.1 Utilize inner light of multiple light sealed units for continuity of airand vapour seal.

.2 Size glass to withstand wind loads, dead loads and positive and negativelive loads to ASTM E330.

.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.2 Tempered glass: to CAN/CGSB-12.1-M90, type 2, class 2, category 2, clear tempered float glass, thickness as determined by opening size or wind/suction loads, whichever is more restrictive, but not less than 6 mm thick.

.1 Roller Wave Tolerance: limit distortions arising from tempering process to a maximum nominal 0.08 mm peak to valley at centre of glass and 0.20 mm within 265 mm of leading and trailing edges of the glass.

.3 Privacy glass:

.1 Approved Manufacturer: Nathan Allan Glass Studios Inc

.2 Type: Grille Glass by Nathan Allan

.3 Thickness: 8mm

.4 Clear Glass, Tempered.

.5 1” OA Insulated Unit, coordinate with window manufacturer.

.6 Sample: Submit sample as per article 1.2.3 to Departmental Representative.

.7 Criteria for Alternates:

1. New privacy glass to match existing privacy glass as closely as possible.

2. Privacy glass shall be textured/patterned glass with small square / grille patterns.

3. Privacy glass shall meet or exceed the performance of the existing glass in strength, durability and integrity.

.4 Insulating Glass Units:

.1 Provide sealed insulating glass units meeting the requirements of CAN/CGSB-12.8-97 and ASTM E2190, composed of two panes of glass factory sealed and separated by dehydrated air space. Make air pressure within sealed air space of insulating glass units to suit atmosphere conditions at the location of the installation to prevent distortion of the installed units. Thickness of glass for each pane determined by window size, snow loads and wind/suction loads but minimum glass thickness 6 mm each pane. 25 mm total thickness.

.2 Do not exceed the maximum deflection of the exterior pane of sealed units after installation with no wind loading of L/1000 where L is the shortest dimensionof the sealed unit. The ratio of the shortest dimension of the sealed unit (L) to the deflection (Y) to be Y/L = 1/1000.

.3 Manufacture sealed insulating glass units without edge channels, that is,with bare edges. Use two stage seal method of manufacture, as follows:

.1 Achieve primary seal with a polyisobutylene seal between glass and separator.

.2 Achieve secondary seal with polysulphide or silicone filling betweenthe two panes of glass at the edge up to the separator and primary seal.

.4 Sealed units: sealed units conforming to CAN/CGSB-12.8-97, with outer pane

of 6 mm tempered glass and inner pane of 6 mm tempered glass; with air space not less than 12 mm.

.5 Where privacy glass is indicated, provide outer pane of sealed units with tempered patterned glass.

.4 Sealant: in accordance with Section 07 92 00- Joint Sealants.

2.3 ACCESSORIES

.1 Provide continuous extrusion glazing gaskets, with integral projection to engage intoand remain inter-locked with the continuous recess in the metal glass holding members and shall be designed to remain firmly in position and to provide a continuous and watertight contact between the glass and the adjacent elements at all levels of the specified performance criteria for dynamic loading and building or thermal movements.

.2 Fixed Glazing Gaskets: extruded (cellular or dense) neoprene, EPDM or silicone conforming to ASTM C864 for dense; ASTM C509, Type II for cellular; and ASTM C1115, Type C, Class F, 45 to 55 Shore A durometer hardness, Grade 5 forsilicone.

.1 Cellular gaskets must be designed to provide 20% to 36% compressionwhen installed.

.2 Length and locations as required and recommended in writing by theapplicable glass manufacturer.

.3 Ensure gasket is smooth and of sizes indicated on the drawings.

.3 Inside and outside glazing gaskets for any one pane or glazed opening to be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs.

.4 Size: Provide glazing gaskets in lengths or units to provide a minimum crowd-in of 1° to 2° to ensure against pull-back at corners, or as otherwise recommended by manufacturer and designed to produce glass edge pressure of 4 to 10 pounds per linear inch.

.5 Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

.1 Silicone Type: Extruded type conforming to ASTM C1115, Type C, 85 ±5 Shore A hardness.

.1 Required only where structural silicone glazing occurs at the sill.

.6 Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass panes in place for installation indicated.

.1 Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.2 Silicone or EPDM spacers required if in contact with silicone sealant.

.7 Edge Blocks: Elastomeric material of hardness needed to limit glass lateralmovement (side walking).

.1 Type: Extruded neoprene conforming to ASTM D395/Method B of between 50 (+ or -5) Shore A durometer hardness.

.2 Lengths and Locations: As required and recommended in writing byglass manufacturer.

.8 Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

.9 Glazing Points, and wire spring clips: corrosion resistant, manufacturer's standard.

Part 3 Execution

3.1 EXAMINATION

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

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Visually inspect substrate.

.4 Inform of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: EXTERIOR - DRY METHOD (PREFORMED GLAZING)

.1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.3 Lock strip gasket method (exterior aluminum doors and frames):

.1 Unpack and lay out gaskets on flat warm area to permit recovery of shape.

.2 Install gaskets under compression from corners inward. Seal corner junctions between gaskets with a black type 1 sealant specified in Section 07 90 00.

.3 Drain infiltrated moisture to exterior through drain holes in sill.

.4 Install locking strip and gasket assembly to manufacturer's instructions.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Iron and Steel Institute (AISI):

.1 AISI S201-07: North American Standard for Cold-Formed Steel Framing - Product Data.

.2 ASTM International (ASTM)

.1 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.

.2 ASTM C475/C475M-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C754-09a, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.4 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.

.5 ASTM C1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.6 ASTM C1047-10, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings, samples and product data in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop drawings:

.1 Submit a wall mullion closure details that describe the wall construction where it will be attached, and strategy for how the closures will address obstructions such as sills and bulkheads.

.3 Product Data:

.1 Submit product data sheets for metal framing materials, hangers, fasteners, gypsum board materials, indicating conformance with the requirements of this Section.

.2 Submit product data sheets, construction methods and applicable listing documents for fire rated assemblies of this Section indicating conformance with the assembly indicated, or, where not indicated on the drawings orspecifications, conformance with Appendix D of the National Building Code.

.3 Submit product data sheets, construction methods and applicable listing documents for acoustically rated assemblies indicating conformance with the assembly indicated and meeting the indicated STC and rating, or, where not indicated on the drawings or specifications, conformance with a listed assembly from one of the following recognized testing agencies:

.1 Intertek.(formerly Warnock Hersey)

.2 National Research Council of Canada

.3 National Institute of Standards and Technology

.4 National Gypsum Company

.5 USG

.6 Other preapproved testing agency.

.4 Samples:

.1 Submit sample of wall to mullion closure complete with gaskets.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.

.3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Performance / Design Criteria:

.2 Fire Rated Assemblies:

.1 Where a ULC (or other testing laboratory) listing is quoted, ensure that all work and materials used in the listed assembly comply with the listing requirements.

.3 Metal Studs: to AISI S201, C-shaped, roll formed, grade 230 sheet steel to ASTM A1003M, Z120 hot dipped galvanized coating to ASTM A653, as follows:

.1 Base metal thickness: minimum 0.46 mm (see 2.3.2 above).

.1 Colour code studs for thickness to AISI S201.

.2 Base metal thickness for studs beside doors and other openings: minimum 0.84 mm.

.3 Use only 0.46 mm base metal thickness framing members for acoustically rated partitions. Where the height of acoustically rated partition requires thicker gauge framing members to meet design loads, inform the Consultant. Proceed only as directed by the Consultant.

.2 Width: as indicated on the drawings.

.3 Flange depth: minimum 32 mm.

.4 Lip: 5 mm, hemmed.

.5 Faces knurled.

.6 Knock-out service holes at minimum 600 mm on centre.

.4 Floor and Overhead Tracks: to AISI S201, U-shaped, roll formed, grade 230 sheet steel to ASTM A1003M, Z120 hot dipped galvanized coating to ASTM A653, as follows:

.1 Base metal thickness: to match studs except use 1.37 mm base metal thickness track to all short walls (150 mm or less in length) before change of direction.

.1 Colour code tracks for thickness to AISI S201.

.2 Width: to suit studs.

.3 Hemmed.

.4 Flange depth:

.1 Floor track: 32 mm.

.2 Overhead single track: 32 mm.

.3 Overhead track for double deflection track: 63 mm except as dictated by approved head of wall fire stop design.

.4 Deflection channel for double deflection track: 63 mm except as dictated by approved head of wall fire stop design.

.5 Metal Channel Stiffeners: 38 mm x 12.7 mm size, 1.37 mm base metal thickness cold rolled steel, coated with rust inhibitive coating.

.6 Gypsum Board:

.1 Gypsum Board for general use: to ASTM C36/C36M and ASTM C1396/C1396M or CSA A82.27, plain, thickness as indicated, x 1200 mm wide x maximum permissible length, ends square cut, edges tapered, paper/paper faced.

.2 Type X Gypsum Board or Fire Rated Gypsum Board: to ASTM C36/C36M and ASTM C1396/C1396M or CSA A82.27, Type 'X' special ULC approved fire retardant type, thickness noted, 1200 mm wide x maximum permissible length, ends square cut, edges tapered, paper/paper faced. Where required to meet ULC or Intertek Testing designs, use “C” formulation fire rated gypsum board.

.3 Glass Mat Faced Gypsum Board: conforming to ASTM C1177, moisture and mould resistant, non combustible gypsum board embedded with coated glass mat faces, exposed face to be smooth and ready for finishing like regular gypsum board, and to resist growth of mould and mildew as per ASTM D3273; 1220 mm wide x maximum permissible length, tapered edges, 12.7 mm thickness generally, 15.9 mm thickness, type X to fire rated assemblies.

2.2 ACCESSORIES

.1 Tape: to ASTM C475, 50 mm wide spark perforated tape; as recommended by the gypsum board manufacturer. To fibre glass faced smooth gypsum board and silicone treated core gypsum board with fibre glass mat faces, provide fibreglass mesh tape as recommended by the board manufacturer.

.2 Jointing compound and skim coat compound: to ASTM C475, slow setting, vinyl bedding and finishing compound, as recommended by gypsum board manufacturer equal to Synko Dust Control Drywall Compound.

.3 Setting Compound: to fibreglass faced gypsum board, use setting compound for fibreglass tape in lieu of regular jointing compound for bedding of fibreglass tape (first coat). Use regular jointing compound for all other coats to joints. Type as recommended by the fibreglass faced gypsum board manufacturer.

.4 Screws: to ASTM C1002, type S for application of gypsum board to metal framing and type G for application of gypsum board to gypsum board; Power drilling self-applying type, case hardened, socketed countersunk head, galvanized, of type and sizes recommended by gypsum board manufacturer and as required for fire rated partitions.

.5 Trim: conforming to ASTM C1047; minimum 0.4 mm thickness commercial grade sheet steel with Z120 zinc coating to ASTM A653M, type specially design for use in gypsum board applications, flanges designed to be concealed with taping compound and as follows:

.1 Casing beads and trim: metal J type or L type as required, beaded angle, with one side knurled or perforated for joint filling, to suit gypsum board thickness.

.2 Corner beads: square, metal, beaded angle, flanges 28.6 mm or 32 mm.

.3 Expansion joints: preformed metal, beaded, with one side perforated for joint filling.

.4 Control Joints: to ASTM C1047, pre-formed galvanized metal or plastic "V" type, perforated flanges.

.6 Closures between backs of window mullions and gypsum board wall ends: preassembled, spring loaded, extruded 6063-T5 temper aluminum partition closures, providing a tight fit for vertical junctions of partitions and window framing, providing an STC rating of 38, complete with acoustical batt insulation; clear anodized aluminum. Provide gaskets with adhesives to both sides of closures to seal between aluminum window and closures and between ends of gypsum board partitions and closures. Acceptable product:

.1 Mullion Mate as manufactured by Gordon Interior Specialties, division of Gordon Inc.

.2 Other preapproved product.

.7 Fire safing filler: to CAN/ULC S115, rock wool or mineral fibre, approved by the authority having jurisdiction for use in walls having a fire resistance rating.

.8 Foam tape: continuous, closed cell, self adhering foam tape, 5 mm x 32 mm.

.9 Polyethylene Gaskets: minimum 5 mm thick x 89 mm wide, polyethylene foam.

.2 Dampproof course: Translucent 0.15 mm polyethylene sheet vapour retarder, conforming to CAN/CGSB-51.34-M86.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to partition installation.

.1 Inform of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION OF FRAMING

.1 Install steel framing members to receive screw-attached gypsum board in accordance with ASTM C754 except where specified otherwise.

.2 Align partition tracks at floor and ceiling and secure at 610 mm on centre maximum.

.3 Place studs vertically at 400 mm on centre and maximum of 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.6 Include two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.7 Install heavy gauge single jamb studs at openings.

.8 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.9 Include 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.10 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.11 Extend partitions to ceiling height except where indicated.

.12 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use double track slip joint.

.13 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.14 Install insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 ERECTION OF GYPSUM BOARD AND ACCESSORIES

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

.3 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture.

.4 Install gypsum boards in direction that will minimize number of end-butt joints. Stagger end joints 250 mm minimum.

3.4 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Apply gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

.3 Install glass mat faced gypsum board to all wet areas and humid areas.

3.5 INSTALLATION - ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install access doors to electrical and mechanical fixtures specified in respective sections.

.1 Rigidly secure frames to furring or framing systems.

.6 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.7 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.8 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.9 At junctions between window mullions and ends of gypsum board partitions, install mullion mate closures to completely fill in gap between back side of curtain wall/window mullions and gypsum board wall ends. Install in strict accordance with manufacturer’s recommendations.

.10 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by partition installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C28/C28M-10: Standard Specification for Gypsum Plasters.

.2 ASTM C35-01(2009): Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster.

.3 ASTM C206-03(2009): Standard Specification for Finishing Hydrated Lime.

.4 ASTM C423-09a: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.5 ASTM C472-99(2014): Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete.

.6 ASTM C587-04(2014): Standard Specification for Gypsum Veneer Plaster.

.7 ASTM C631-09: Standard Specification for Bonding Compounds for Interior Gypsum Plastering.

.8 ASTM C841-03(2013): Standard Specification for Installation of Interior Lathing and Furring.

.9 ASTM C842-05(2010)e1: Standard Specification for Application of Interior Gypsum Plaster.

.10 ASTM C843-99(2006): Standard Specification for Application of Gypsum Veneer Plaster.

.11 ASTM C844-04(2010): Standard Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster.

.12 ASTM C847-12: Standard Specification for Metal Lath.

.13 ASTM C933-13: Standard Specification for Welded Wire Lath.

.14 ASTM C1396/C1396M-14: Standard Specification for Gypsum Board.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB 51.34-M86: Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA International).

.1 CAN/CSA-ISO 9001:08(R2014): Quality Management Systems - Requirements.

.2 CAN/CSA-ISO 9003-94(R2001): Manual Checklist for the Hardware and Process Product Sectors.

.3 CAN/CSA-ISO 14040-06(R2011): Environmental Management-Life Cycle Assessment-Principles and Framework.

.4 CSA Z760-94(R2001): Life Cycle Assessment.

.4 Underwriters Laboratories (UL):

.1 UL 126: Standard for Sustainability for Plastic Film Products.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum plaster materials and include product characteristics, performance criteria, physical size, finish and limitations.

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

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.1 Ensure materials remain in original wrapping and containers until used.

.2 Deliver lath and plaster products to job site just prior to application.

.3 Deliver fresh plaster as needed to job site.

.3 Storage and Handling Requirements:

.1 Store gypsum plastering materials indoors in dry location away from heavy traffic areas and in accordance with manufacturer's recommendations.

.2 Store and protect bagged goods from direct contact with rain, snow, splashing water, wet or damp surfaces, condensation and absorption from the atmosphere.

.3 Stack plaster bags on planks or platforms away from damp floors and walls.

.4 Store gypsum plaster bases flat on clean dry floor.

.5 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Site Requirements:

.1 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.

.2 Ambient Conditions:

.1 Ventilation:

.1 Provide free circulation of air to carry off excess moisture.

.2 Mechanically remove moisture laden air in areas lacking normal ventilation.

.3 Protect plaster from vent drafts, heaters or windows, to avoid uneven drying.

.4 Avoid excessive ventilation or air movement to allow plaster to properly set.

.5 Screen exterior openings in building.

.2 Temperature:

.1 Do not apply plaster to surfaces containing frost.

.2 Maintain temperature above 13 degrees C for 48 hours prior to erection of gypsum plaster base, prior to and during application of plaster, and for 48 hours following installation of plaster or until plaster is dry.

.3 Distribute heat well to areas.

.4 Prevent irregular heat on plaster near source by providing deflection or protective screens.

Part 2 Products

2.1 MATERIALS

.1 Basecoat plasters:

.1 Gypsum neat plaster (hardwall): ASTM C28/C28M.

.2 Gypsum mill aggregated plaster: ASTM C35.

.3 Gypsum bonding plaster: ASTM C28/C28M.

.2 Finishing plaster:

.1 Hydrated finishing lime.

.1 Type S: to ASTM C206.

.2 Gypsum gauging plaster.

.1 To ASTM C28/C28M.

.2 Add to lime putty in proportion of 1 part dry gauging plaster by weight to 2 parts dry lime by weight.

.3 Grounds.

.1 Metal casing beads applied at perimeter of all openings.

.2 Set over gypsum lath to obtain minimum 12.7 mm plaster thickness.

.3 Set over brick, clay tile or other masonry to obtain minimum 15.9 mm plaster thickness.

.4 Set over metal lath to obtain minimum 15.9 mm plaster thickness from face of lath.

.4 Screeds: install plumb and level to allow for 1.6 mm finish coat.

.5 White Gauging Plasters.

.1 Slow set.

.6 Sand aggregate for use in basecoat plasters: ASTM C35.

.3 Texturing plaster: mill mixed finishing plaster prepared for texture application, to match Consultant's sample.

.4 Water.

.1 Clean, fresh, potable.

.2 Free from mineral and organic substances which affect plaster set.

.3 No more than required for plaster of workable consistency.

.4 20 degrees Celsius.

.5 Polyethylene film:

.1 CAN/CGSB 51.34, Type 2.

.1 Acceptable material: ECP-69.

.2 EcoLogo certified.

.6 Bonding agent: ASTM C631.

.7 Hair:

.1 Free of knots, dust and balls.

.2 Washed clean of pesticides.

.8 Retarder: as recommended by the manufacturer.

.9 Accelerator: as recommended by the manufacturer.

.10 Accessories: zinc alloy.

2.2 MIXES

.1 Mix plasters to ASTM C841.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Prepare surfaces to receive plaster in accordance with ASTM C841 exceptwhere specified otherwise.

.2 Ensure grounds, screeds, beads and accessories are in place and conduits, pipes, cables and outlets are properly plugged, capped or covered before commencing work.

.3 Where plaster butts exposed masonry walls, insert 1 m wide strip of polyethylene before applying plaster to protect masonry. Cut polyethylene neatly at junction with plaster when plastering completed.

.4 Do not plaster adjacent to aluminum or finished work until such work is masked.

.5 Apply bonding agent to concrete and bonding plaster to masonry surfaces in accordance with manufacturer's instructions.

3.3 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Do plastering work in accordance with ASTM C842 except where specified otherwise.

.3 Apply plaster finish level and plumb to maximum variation of 3 mm in 2.5 m in any plane.

.4 Use three coat plaster in all areas.

.5 Form small vee groove where plaster finish is flush with bases, window frames, glazed wall tiles or similar construction.

.6 Basecoat Plaster.

.1 12.7 mm thick.

.2 Mix following manufacturer's directions.

.3 Wet unit masonry surfaces.

.4 Treat monolithic concrete with application of plaster bonder before plastering.

.5 Fur and lath interior surface of exterior masonry or monolithic concrete walls prior to plastering.

.6 Apply scratch (first) coat with sufficient materials and pressure to form good full keys on metal lath, and good bond on other bases.

.7 Cross rake.

.8 Apply brown (second) coat after first coat has set firm and hard.

.9 Bring out to grounds and straighten to a true surface with rod and darby without use of additional water.

.10 Leave surface rough to receive finish (third) coat.

.11 Cut base coats free of bucks, frames and grounds to allow for movement. Cut plaster free of electrical outlet boxes and other opening.

.7 Finishing Plaster.

.1 Mix, in proportion according to applicable bag directions.

.2 Trowel Finish Coats.

.1 Scratch plaster in thoroughly and immediately double back to fill out to smooth, dense surface for decoration, free of surface blemishes and irregularities.

.2 Apply 1.5 mm finish coat.

.3 Float Finish Coats.

.1 Scratch plaster in thoroughly and immediately double back to a true, even surface.

.2 Float using a rubber float to bring aggregate to surface to produce finish of uniform texture free of slick spots, cat faces, and other blemishes.

.3 Use water sparingly on natural colour and no water on coloured finishes.

.4 Machine-Applied Spray Finishes.

.1 Apply initial coat of finish by hand.

.2 Float to uniform texture surface to provide background.

.3 Apply plaster in uniform spray pattern to produce texture approved by Consultant.

.5 Finish Coat: leave brown coat properly roughened and open as well as partially dry (green state) to receive finish coat.

.8 Mix Retarder.

.1 Mix retarder with water before adding to plaster.

.2 Slowly add retarder to water and stir until retarder is completely dispersed.

.3 Screen out any retarder lumps which have formed.

.4 Stir retarder mixture before using.

.9 Mix Accelerator.

.1 Sprinkle, in dry form, into mixer after plaster has been added. Follow manufacturer's instruction.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by gypsum plastering installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

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

.1 Material Safety Data Sheets (SDS).

.2 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

.2 Maintenance Repainting Manual - current edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29 - Health and Safety Requirements.

.1 Samples:

.1 Provide six (6) paint samples of each type and colour of coating for acceptance.

.1 Provide paint samples for metal surfaces on minimum 150 mm x 150 mm x 0.61 mm sheet metal.

.2 Provide all other paint samples on minimum 216 mm x 227 mm card stock.

.2 Identify each sample as to manufacturer, finish, formula, colour name and number and sheen name and gloss units.

.3 Submit paint samples with references to room numbers, and identification of exterior wall locations and materials for all paints that are to be matched.

1.2 QUALITY ASSURANCE

.1 Acceptable manufacturer's, materials, workmanship and all items affecting the work of this Section is to be in accordance with the specifications in the first instance and The Master Painters Institute "Architectural Painting Specification Manual" current edition.

.2 On a continuous basis, conduct detailed and thorough inspections of the work being performed and ensure that the work conforms to the specifications. Any inspections performed by the Owner or his representatives is not intended to substitute for the Contractor's responsibilities under the contract documents.

.3 Qualifications:

.1 The Subcontractor performing the work of this Section must have a minimum of five (5) year experience as a recognized independent Contractor specializing in this work whose work has resulted in applications with a record of successful in-service performance.

.2 Employ journeymen painters and non-journeymen to the requirements of the MPI.

.4 Mock-ups:

.1 Before proceeding with work of this Section, finish one complete surface or item of each colour scheme and paint type required showing selected colours, finish texture, materials and workmanship. Call for an inspection by Consultant prior to proceeding with further painting.

.2 After acceptance, the sample spaces or items will become the standard for work throughout the project.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store painting materials and supplies away from heat generating devices.

.3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.4 Fire Safety Requirements:

.1 Supply Type ABC dry chemical 9 kg fire extinguisher adjacent to 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 (NFC) requirements.

1.4 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces in accordance with Section 01 51 00- Temporary Utilities.

.2 Co-ordinate use of existing ventilation system with Owner and ensure its operation during and after application of paint as required.

.3 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, masonry and plaster surfaces for alkalinity as required.

.3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.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.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Owner such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

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 in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual "Approved Product" listing.

.1 Use MPI listed materials having E3 rating.

.4 Colours:

.1 Match existing, or as otherwise directed by the Departmental Representative.

.5 Mixing and tinting:

.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from Consultant for tinting of painting materials.

.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.

.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.

.6 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	Max. 5	Max. 10

Finish		
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.

.7 Exterior painting:

.1 Structural Steel and Metal Fabrications: EXT 5.1G - Premium Grade – G5 gloss level.

.8 Exterior re-painting:

.1 Metal: REX 5.1CC - Premium Grade – G5 gloss level.

.9 Interior painting:

.1 Structural Steel and Metal Fabrication: Intumescent Paint:

.2 Steel: INT 5.1B - Premium Grade – G5 gloss level.

.3 Plaster and Gypsum Board: INT 9.2B – Premium Grade – G3 gloss level.

.10 Interior re-painting:

.1 Steel: RIN 5.1B - Premium Grade – G5 gloss level.

.2 Galvanized steel: RIN 5.3B – Premium Grade – G5 gloss level.

.3 Plaster and Drywall: RIN 9.2B - Premium Grade – G3 gloss level.

Part 3 Execution

3.1 GENERAL

.1 Compliance: 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 - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 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 acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection of in-place conditions:

.1 Protect existing building surfaces and adjacent structures from paint spatters, 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 priorto undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.

.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress.

.4 Clean and prepare surfaces in accordance with MPI - Maintenance Repainting Manual and MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, othercorrosive 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.

.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.

3.4 APPLICATION

.1 Paint only after prepared surfaces have been accepted by Departmental Representative.

.2 Use method of application accepted by the Departmental Representative.

.1 Conform to manufacturer's application recommendations.

.3 Apply coats of paint in continuous film of uniform thickness.

.1 Repaint thin spots or bare areas before next coat of paint is applied.

.4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.5 Sand and dust between coats to remove visible defects.

.6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projectingledges.

.7 Finish inside of cupboards and cabinets as specified for outside surfaces.

.8 Finish closets and alcoves as specified for adjoining rooms.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.10 Mechanical/Electrical Equipment:

.1 Paint conduits, piping, hangers, ductwork and other mechanical andelectrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.

.2 Do not paint over nameplates.

.3 Keep sprinkler heads free of paint.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools andequipment in accordance with Section 01 74 00- Cleaning.

END OF SECTION

APPENDIX

March 9, 2018 1081BB-18-001

Parks Canada
P.O. Box 220
Radium Hot Springs, BC, V0A 1M0
Email: scott.turnbull@pc.gc.ca

SENT VIA E-MAIL

Attention: Scott Turnbull

RE: LIMITED HAZARDOUS MATERIALS ASSESSMENT RADIUM HOT POOLS WINDOW REPLACEMENT

Dear Mr. Turnbull,

Further to your request, EHS Partnerships Ltd. (EHS^P) has completed a limited hazardous material assessment in advance of the Window Replacement Project at the Radium Hot Pools (Project Area). The assessment was conducted on February 2, 2018 by Justin Cybulsky, Project Coordinator, under the direction of Brad Burwash, Division Manager for EHS Partnerships Ltd.

A previous assessment was completed in select areas on July 24, 2017 by EHS^P. The hazardous materials identified in the report impacted by the project scope were reviewed during the 2018 assessment and are summarized in this report.

SCOPE OF WORK

The assessment was completed to determine the presence of hazardous materials, including asbestos-containing materials (ACM) and lead-based paint.

REGULATIONS AND GUIDELINES

PROVINCIAL OCCUPATIONAL HEALTH AND SAFETY REGULATIONS

Provincial workplace health and safety is regulated in British Columbia by WorkSafe BC (formerly the Workers' Compensation Board of British Columbia) under the Workers' Compensation Act (the Act), as amended by the Workers' Compensation (Occupational Health and Safety) Amendment Act (effective October 1, 1999). The Act and related Regulations and Guidelines define the general duties and obligations of the employer, employees and others at the workplace.

Specifically, section 5.54 of the British Columbia Workers Compensation Act and the Occupational Health and Safety Regulations (OHSR) defines the requirement to develop an exposure control plan when a worker may be exposed to a hazardous substance at a concentration above 50% of its exposure limit.

ENVIRONMENTAL REGULATIONS

In British Columbia, environmental matters pertaining to waste generally fall under the jurisdiction of the British Columbia Ministry of Environment (MoE), pursuant to the British Columbia Environmental

Management Act (EMA). The waste regulation under the EMA relating to the disposal of hazardous building materials is the Hazardous Waste Regulation (HWR), BC Regulation 63/88, as amended by BC Reg. 63/2009.
The HWR refers to the handling, storage, transportation, treatment, recycling and disposal of special wastes in the province. The regulation outlines the materials and criteria to be used to characterize waste as hazardous.

Asbestos-Containing Materials (ACM)

Asbestos-containing materials and lead-based paints are regulated by the Act under Part 6 of OHSR (BC Reg.) 296/97, as amended by BC Reg. 199/2014.

WorkSafe BC has published Safe Work Practices for Handling Asbestos, 2012. This manual outlines basic information on asbestos and asbestos products, health hazard requirements for worker protection, safe work procedures and principles that should be followed when developing exposure control plans and selecting the most suitable technique for the safe abatement of asbestos-containing materials. This document provides a guide to current practices that are to be followed in the Province of British Columbia.

Lead-Based Paint (LBP) Regulations

Presently there are no regulations in British Columbia specifically addressing lead levels in paint. However, employers, general construction contractors and trade contractors have the duty under the OHSR to protect workers from exposure to lead. Under Canadian Federal Law, paints containing greater than 90 ppm lead are considered lead-containing paint. However, this is a value to keep the lead concentration in surface coatings as low as possible and should not be confused with health based standards which correlates to acceptable blood lead levels.

When disturbing lead based paint, it is applicable to use the regulations set by the U.S. Department of Housing and Urban Development (HUD). HUD classifies lead-based paint as any paint application containing at least 1.0 milligram of lead per square centimeter of surface area (mg/cm^2), or 5000 ppm lead by weight, tested by chemical analysis. Further studies conducted by the U.S. Occupational Safety and Health Association (OSHA) have been done on the removal of materials with lead based paints. Improper removal techniques of lead-based paints containing greater than 600 ppm have been shown in these studies to exceed 50% of the Occupational Exposure Limit (OEL) of airborne lead particulate. As per section 6.60 of the OHSR and the Lead-Containing Paints and Coatings Guidelines, (2011), an exposure control plan must be implemented when impacting paints containing greater than 600 ppm lead

The Lead-Containing Paints and Coatings Guidelines (2011), published by Worksafe BC provides additional information on the development of effective exposure control plans for various tasks that involve impacting lead-based paints.

The British Columbia Environmental Management Act – Hazardous Waste Regulations [B.C. Reg. 63/88 inc. amendments to Reg 179/2016] (HWR) are regulations set out to protect the environment from hazardous materials. The present requirement under HWR is to prevent the release of lead into the environment. Disposal of leachable lead-based products is outlined in the Lead-Containing Paints and Coatings Guidelines, issued by Work Safe BC. Table 1 of the HWR classifies leachable lead-based products as any application containing at least 5.0 milligrams of leachable lead per Litre (mg/L), tested by TCLP analysis.

TRANSPORTATION REGULATIONS

The transportation of hazardous wastes is governed under the Federal Transportation of Dangerous Goods Act and Regulations that outline the requirements for storage, handling, and transportation of such waste.

METHODOLOGY

When sampling for hazardous building materials, room names and numbers were assigned by EHS[P] to ensure continuity and accuracy of information compiled during the survey.

All work was conducted in accordance with standards outlined by WorkSafe BC, and the National Institute for Occupational Safety and Health (NIOSH).

Asbestos-Containing Materials

The survey was completed to determine the extent of ACM within the Project Area. The survey was completed on a room-by-room basis to provide a complete inventory of Project Area. The systems which were reviewed included, but were not limited to:

- Structural - systems including fireproofing on beams, open and solid webbed joist systems, Q-deck; asbestos-containing spray-applied insulation;

- Mechanical - systems insulation including hot water and steam system, condensate system, chilled water system, glycol system, domestic hot and cold water, emergency generator exhaust, boiler units, heat exchangers, reboiler units, and asbestos cement piping, asbestos-containing mechanical insulation. During the assessment the Project Area was visually inspected for the presence of asbestos cement pipe and wall board; and

- Architectural - systems including texture coats, sheet flooring, vinyl floor tile, acoustical spray-applied materials, condensation control applications, ceiling tile, wall board, drywall joint compound, asbestos sheet products.

Systematic sampling of identified suspect ACM was conducted as part of the assessment. The asbestos samples were analyzed for asbestos type and percentage content using Polarized Light Microscopy in accordance with National Institute for Occupational Safety and Health (NIOSH) methodologies and United States Environmental Protection Agency dispersion staining techniques (EPA/600/R-93/116).

Lead-Based Paint

Testing for lead-based paint was conducted by collecting bulk samples of the suspect material. Typically finished interior and exterior painted surfaces were tested for the presence of lead paint. Samples from each colour, material were submitted for analysis. Results are reported as parts per million (ppm).

RESULTS AND OBSERVATIONS

Asbestos-Containing Materials

Fourteen (14) samples of building materials were collected and submitted with a chain of custody for analysis. Table 1: Results of Asbestos Analysis, details the results of the survey. The laboratory report is attached in Appendix I. A Photographic Log displaying the identified ACM is presented in Appendix II.

Table 1: Results of Asbestos Analysis

Sample Number	Location	Sample Description	Asbestos Type and Percent
1	Ground Floor East Window Exterior	Caulking (Grey)	None Detected
2	**Ground Floor East Window Exterior**	**Glazing Putty (Black)**	**Chrysotile 13.4%**
3	**Ground Floor North Window Interior**	**Caulking (White)**	**Chrysotile 2.29%**
4	**Ground Floor North Window Exterior**	**Caulking (Grey)**	**Chrysotile 1.47%**
5	Ground Floor North Wall	Drywall Joint Compound	None Detected
6	Ground Floor North Wall	Plaster	None Detected
7	**Ground Floor South Window Interior**	**Glazing Putty (Black)**	**Chrysotile 6.57%**
8	Ground Floor South Wall	Plaster	None Detected
9	Ground Floor West Window Exterior	Caulking (Black)	None Detected
10	**Main Floor East Window Interior**	**Caulking (Grey)**	**Chrysotile 2%**
11	**West Recreation Room Exterior**	**Stucco**	**Chrysotile 2%**
12	**West Recreation Room Window Interior**	**Caulking (White)**	**Chrysotile 2.91%**
13	Main Floor East Wall	Plaster	None Detected
14	**Main Floor East Exterior**	**Stucco**	**Chrysotile 1%**

In addition to the non-asbestos-containing materials identified in Table 1, other materials not suspected to contain asbestos were identified in the following locations:

- Wood, cement, and metal building materials located throughout the Project Area.

Lead-Based Paint

Multiple samples of paint suspected to be lead-based were collected from typically finished interior and exterior surfaces of the Project Area and submitted with a chain of custody for analysis. Table 3: Results of Paint Analysis, details the results of the survey. A Photographic Log displaying the identified Lead Based Paint is presented in Appendix II.

Table 3: Results of Paint Analysis

Sample Number	Colour	Substrate	Location	Concentration (ppm)
Pb-B1	Beige	Plaster	Ground Floor Walls	<5
Pb-B2	**Green**	**Wood**	**Ground Floor Window Frames**	**1,320**
Pb-B3	White	Concrete	Basement Mechanical Room	5

It is noted that green paint has been identified under new layer of paint on wooden window frames in the Project Area. All wood window frames in the project area are suspect to contain green lead-based paint.

The assessment completed in 2017 has identified the following lead-based paints in the Project Area. The Analysis Report is found in Appendix III:

- Silver paint on metal, outside bathroom exterior window frames;
- silver paint on wood, lobby window frames;
- white paint on plaster, outside bathroom interior window frames;
- black paint on wood, lobby window frames; and,
- beige paint on wood, lobby window ledges.

DISCUSSION

Asbestos-Containing Materials

Caulking

Six (6) samples of caulking were collected from the windows of the Project Area, four (4) were found to contain asbestos. All caulking found on the windows of the Project Area should be treated as asbestos containing.

Glazing Putty

Two (2) samples of glazing putty were collected from the windows of the Project Area, all were found to contain asbestos. All glazing putty found on the windows of the Project Area should be treated as asbestos containing.

Stucco

Two (2) samples of stucco were collected on the exterior of the building and both were found to contain asbestos. All black stucco found on the south facing side of the Project Area should be treated as asbestos containing.

Lead-Based Paint

Green, silver, white, black, and beige painted window frames and ledges in the Project area should be treated as lead-based.

CONCLUSIONS AND RECOMMENDATIONS

1. Prior to completing renovations or demolition, any asbestos containing materials that will be impacted must be encapsulated, enclosed or removed. If the ACM is to be removed. The ACM removal procedures include the following:

    - Moderate-risk abatement procedures must be followed to remove the asbestos-containing stucco in the Project Area as per WorkSafeBC's Safe Work Practices for Handling Asbestos, 2012.

    - Low-risk abatement procedures must be followed to remove the asbestos-containing caulking in the Project Area as per WorkSafeBC's Safe Work Practices for Handling Asbestos, 2012.

    Asbestos abatement should be completed by workers qualified in the removal of ACM. Throughout the abatement activities, appropriate air monitoring and inspections should be conducted by qualified personnel to demonstrate that work procedures are effective, asbestos is contained, and the waste is handled appropriately. It is recommended that a proper scope of work and asbestos removal specifications be developed that detail the complete and proper removal of identified ACM.

2. Building material containing lead based paint must be properly disposed of as per the Hazardous Waste Regulation (HWR). If the paint is to be removed and segregated from the waste stream, exposure control plans must be developed and followed to keep worker exposure as low as reasonably achievable by following the guidelines presented in WorkSafeBC's Lead-Containing Paints and Coatings Guideline, 2011.

    Prior to disposal, TCLP testing should be completed on surfaces with lead based paint in poor condition. The TCLP analysis is conducted to determine leachable content of the lead based paint, note that the results of the TCLP analysis may affect the disposal criteria.

LIMITATIONS

The conclusions and recommendations contained in this assessment report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted environmental assessment standards and practices applicable to these locations and are subject to the following inherent limitations:

1. The data and findings presented in this report are valid as of the dates of the investigations. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration at the property, analysis of the data, and re-evaluation of the findings, observations, and conclusions expressed in this report.

2. The data reported and the findings, observations and conclusions expressed in this report are limited by the Scope of Work. The Scope of Work was defined by the request of the client, the time and budgetary constraints imposed by the client, and availability of access to the property.

3. Because of the limitations stated above, the findings, observations and conclusions expressed by EHS^{P} in this report are not, and should not be, considered an opinion concerning compliance of any past or present owner or operator of the site with any federal, provincial or local laws or regulations.

4. No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence at the time of investigation.

5. EHS^{P} assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws and regulations, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of EHS^{P}'s liability. EHS^{P}'s liability extends only to its client and not to other parties who may obtain this assessment report. Issues raised by the report should be reviewed by appropriate legal counsel.

CLOSURE

We trust the information presented in this report meets your requirements. If you have any questions please feel free to contact the undersigned at 403.243.0700. Thank you for the opportunity to be of service.

EHS PARTNERSHIPS LTD.
per:

Report prepared by:

Justin Cybulsky
Project Coordinator

Report reviewed by:

Brad Burwash, B.A.Sc., CRSP
Division Manager

Ref: Z:\Project\1080 - 1089\1081 Parks Canada\2018 Projects\1081BB-18-001 Radium Hot Springs\Window Hazmat Report.docx

APPENDIX I

LABORATORY RESULTS

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Certificate of Analysis

EHS Partnerships Ltd. (Calgary)

4303-11 St. SE
Calgary, AB T2G 4X1
Attn: Justin Cybulsky

Client PO:
Project: 1081BB-18-001
Custody:

Report Date: 13-Feb-2018
Order Date: 12-Feb-2018

Order #: 1807086

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1807086-01	1 - Ground Floor East Window
1807086-02	2 - Ground Floor East Window
1807086-03	3 - Ground Floor North Window
1807086-04	4 - Ground Floor North Window Exterior
1807086-05	5 - Ground Floor North Wall
1807086-06	6 - Ground Floor North Wall
1807086-07	7 - Ground Floor South Window
1807086-08	8 - Ground Floor South Wall
1807086-09	9 - Ground Floor West Window
1807086-10	10 - Main Floor East Window
1807086-11	11 - West Rec Room Exterior
1807086-12	12 - West Rec Room
1807086-13	13 - Main Floor East Wall
1807086-14	14 - Main Floor Exterior

Approved By:

Emma Diaz

Senior Analyst

PARACEL LABORATORIES LTD

Order #: 1807086

Report Date: 13-Feb-2018

Certificate of Analysis

Client: **EHS Partnerships Ltd. (Calgary)**

Order Date: 12-Feb-2018

Client PO:

Project Description: 1081BB-18-001

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Paracel I.D.	Sample Date	Layers Analyzed	Colour	Description	Asbestos Detected:	Material Identification	% Content
1807086-01	02-Feb-18	sample homogenized	Grey	Caulking	No	Client ID: 1 - Ground Floor East Window [AS-PRE]	
						MMVF	<MDL
						Non-Fibers	100
1807086-02	02-Feb-18	sample homogenized	Black	Caulking	Yes	Client ID: 2 - Ground Floor East Window [AS-PRE]	
						Chrysotile	13.4
						Non-Fibers	86.6
1807086-03	02-Feb-18	sample homogenized	White	Caulking	Yes	Client ID: 3 - Ground Floor North Window [AS-PRE]	
						Chrysotile	2.29
						Non-Fibers	97.71
1807086-04	02-Feb-18	sample homogenized	Grey	Caulking	Yes	Client ID: 4 - Ground Floor North Window Exterior [AS-PRE]	
						Chrysotile	1.47
						Non-Fibers	96.33
						Other fibers	2.2
1807086-05	02-Feb-18	sample homogenized	White	Drywall Joint Compound	No	Client ID: 5 - Ground Floor North Wall	
						Non-Fibers	100
1807086-06	02-Feb-18	sample homogenized	White	Plaster	No	Client ID: 6 - Ground Floor North Wall	
						Non-Fibers	100
1807086-07	02-Feb-18	sample homogenized	Black	Caulking	Yes	Client ID: 7 - Ground Floor South Window [AS-PRE]	
						Chrysotile	6.57
						Non-Fibers	93.43
1807086-08	02-Feb-18	sample homogenized	Beige	Plaster	No	Client ID: 8 - Ground Floor South Wall	
						Non-Fibers	100
1807086-09	02-Feb-18	sample homogenized	Black	Caulking	No	Client ID: 9 - Ground Floor West Window [AS-PRE]	
						Non-Fibers	100
1807086-10	02-Feb-18	sample homogenized	Grey	Caulking	Yes	Client ID: 10 - Main Floor East Window [AS-PRE]	
						Chrysotile	2
						Non-Fibers	98
1807086-11	02-Feb-18	sample homogenized	Black	Stucco	Yes	Client ID: 11 - West Rec Room Exterior	
						Chrysotile	2
						Cellulose	3
						Non-Fibers	95
1807086-12	02-Feb-18	sample homogenized	White	Caulking	Yes	Client ID: 12 - West Rec Room [AS-PRE]	
						Chrysotile	2.91
						Non-Fibers	97.09

PARACEL LABORATORIES LTD

Order #: 1807086

Report Date: 13-Feb-2018

Certificate of Analysis

Client: **EHS Partnerships Ltd. (Calgary)**

Order Date: 12-Feb-2018

Client PO:

Project Description: 1081BB-18-001

Asbestos, PLM Visual Estimation **MDL - 1.0%**

Paracel I.D.	*Sample Date*	*Layers Analyzed*	*Colour*	*Description*	*Asbestos Detected:*	*Material Identification*	*% Content*
1807086-13	*02-Feb-18*	*sample homogenized*	*White*	*Plaster*	*No*	*Client ID: 13 - Main Floor East Wall*	
						Non-Fibers	100
1807086-14	*02-Feb-18*	*sample homogenized*	*Black*	*Stucco*	*Yes*	*Client ID: 14 - Main Floor Exterior*	
						Chrysotile	1
						Cellulose	1
						Non-Fibers	98

** MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool*

**** Analytes in bold indicate asbestos mineral content.**

Analysis Summary Table

Analysis	*Method Reference/Description*	*Lab Location*	*Analysis Date*
Asbestos, PLM Visual Estimation	*by EPA 600/R-93/116*	*3 - Calgary*	*13-Feb-18*

Qualifier Notes

Sample Qualifiers :

AS-PRE: Due to the difficult nature of the bulk sample (interfering fibers/binders), additional NOB preparation was required prior to analysis

Work Order Revisions / Comments

None

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Chain of Custody
(Lab Uk Only)

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ASBESTOS & MOLD ANALYSIS

ParactlOrder Numbt r: I D7-ot1o .

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7 GtoundFloorSouthWrr,tJqw	,,,,,			Ceulkl,g(bl><l<)			
8 G«iunCl FloorSoulhWall	,,,,,,•						
9 GtoundFlQofWt$t Winclow	,,,,,,•			Caul kl,g(blad<)			
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Certificate of Analysis

EHS Partnerships Ltd. (Calgary)

4303-11 St. SE
Calgary, AB T2G 4X1
Attn: Justin Cybulsky

Client PO:
Project: 1081BB-001
Custody:

Report Date: 13-Feb-2018
Order Date: 12-Feb-2018

Order #: 1807087

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1807087-01	PB-1 Ground Floor Beige
1807087-02	PB-2 Ground Floor Green
1807087-03	PB-3 Basement White

Approved By:

Milan Ralitsch, PhD
Senior Technical Manager

PARACEL LABORATORIES LTD.

Order #: 1807087

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO:

Report Date: 13-Feb-2018

Order Date: 12-Feb-2018

Project Description: 1081BB-001

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Lead in Paint	EPA 6020 - Digestion - ICP-MS	13-Feb-18	13-Feb-18

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

PARACEL LABORATORIES LTD.

Order #: 1807087

Certificate of Analysis

Client: EHS Partnerships Ltd. (Calgary)

Client PO:

Report Date: 13-Feb-2018

Order Date: 12-Feb-2018

Project Description: 1081BB-001

Sample Results

Lead

Matrix: Paint

Sample Date: 02-Feb-18

Paracel ID	Client ID	Units	MDL	Result
1807087-01	PB-1 Ground Floor Beige	ug/g	5	<5
1807087-02	PB-2 Ground Floor Green	ug/g	5	1320
1807087-03	PB-3 Basement White	ug/g	5	5

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	**ND**	**5**	**ug/g**						
Matrix Duplicate									
Lead	**ND**	**5**	**ug/g**	**ND**			**0.0**	**50**	
Matrix Spike									
Lead	1300	5	ug/g	ND	104	70-130			

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Required Analyses

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	Sample ID/LocationName				Date	Time										
	PS-1 Ground Floor e	●			2/2/18		0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	PS-2Grot.ll'KI Aoo,Gleen	●			212/18		0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	PB-3 semcntwti1e	●			212/18		0	☐	☐	☐	☐	☐	D	D	☐	D	D
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8							☐	☐	☐	D	☐	D	D	☐	D	☐	☐
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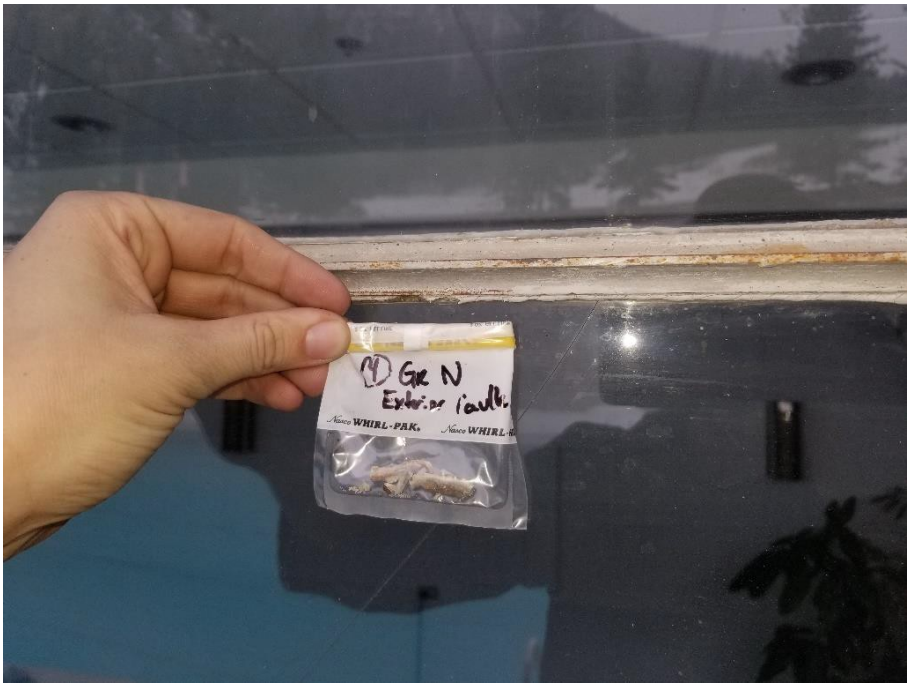
APPENDIX II

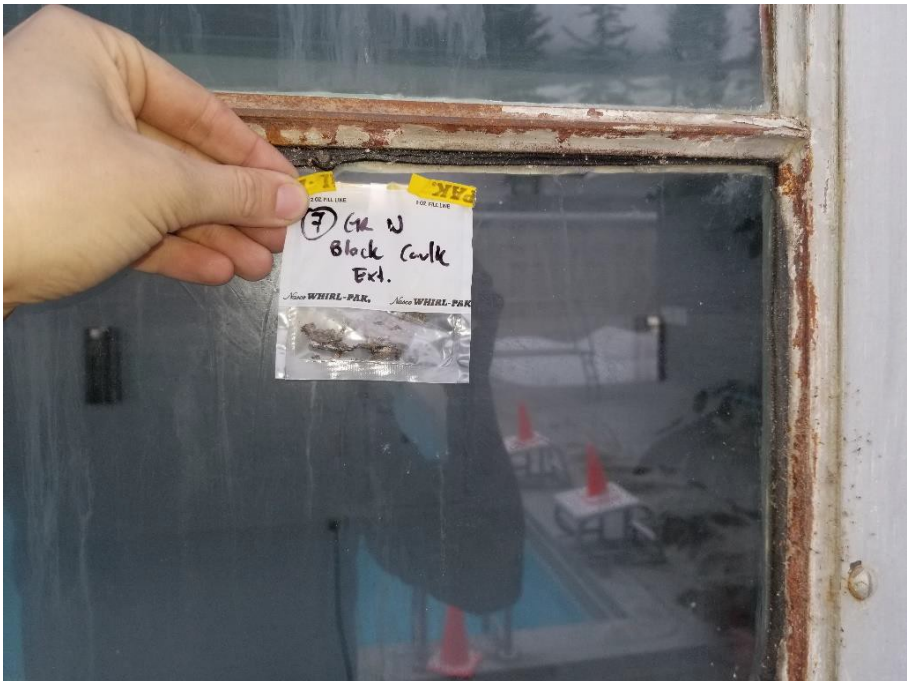
PHOTOGRAPHIC LOG

Photograph 1: Asbestos-Containing Glazing Putty Ground Floor East

Photograph 2: Asbestos-Containing Window Caulking Ground Floor North



Photograph 3: Asbestos-Containing Window Caulking Ground Floor North



Photograph 4: Asbestos-Containing Glazing Putty Ground Floor South

Photograph 5: Asbestos-Containing Window Caulking Main Floor East

Photograph 6: Asbestos-Containing Window Caulking West Recreation Room

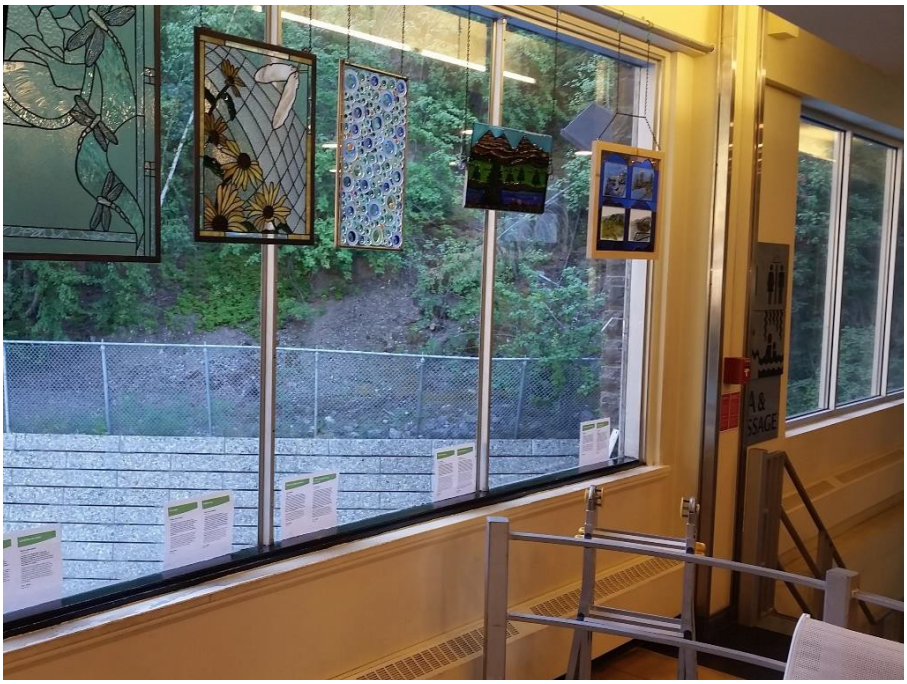
Photograph 7: Asbestos-Containing Stucco

Photograph 8: Green Lead-Based Paint on Window Frames

Photograph 9: Silver Lead-Based Paint on Exterior Bathroom Window Frames

Photograph 10: Silver Lead-Based Paint on South Window Frames

Photograph 11: Beige Lead-Based Paint on Exterior Bathroom Plaster



Photograph 12: White Lead-Based Paint on Lobby Window Frames

APPENDIX III

2017 LEAD-BASED PAINT ANAYSIS REPORT

LEAD-CONTAINING SURFACE COATING ANALYSIS REPORT

Client: Parks Canada **Attention: Mr. Scott Turnbull**	**Date: July 28, 2017** **Date Submitted: July 25, 2017**

Project Name: Radium Hot Pools
Project Number: 1081BB-17-002

Analysis Results

Reference Number	Colour	Substrate	Location	Concentration (ppm)
Pb-B1	Beige	Drywall	Kitchen / Locker Room	15
Pb-B2	**Yellow**	**Wood**	**Laundry Room Post Footing**	**23,100**
Pb-B3	Beige	Wood	Laundry Room Post	9
Pb-B4	**White**	**Concrete**	**Hallway Ceiling**	**2,450**
Pb-B5	Beige	Cinderblock	Hallway Wall	307
Pb-B6	Green	Concrete	Glycol Room Wall	11
Pb-B7	**Grey**	**Wood**	**Pool Loop Door**	**11,800**
Pb-B8	White	Concrete	Pool Loop Wall	176
Pb-B9	Yellow	Concrete	Pool Loop Wall	152
Pb-B10	Black	Concrete	Pool Loop Ceiling	22
Pb-B11	**Mint Green**	**Wood**	**Office Door**	**18,700**
Pb-B12	Green	Wood	Parts Room Door Frame	75
Pb-B13	Beige	Wood	Parts Room Door	858
Pb-B14	**Grey**	**Wood**	**Parts Room Cabinets**	**7,050**
Pb-B15	**Yellow**	**Cinderblock**	**West Elevator Lobby**	**1,910**
Pb-B16	**Yellow**	**Plaster**	**West Pump Room Post Footing**	**9,730**
Pb-B17	Brown	Plaster	West Pump Room Post	<5
Pb-B18	Grey	Concrete	West Pump Room Floor	451
Pb-B19	Green	Cinderblock	West Pump Room Wall	160
Pb-B20	Mint Green	Metal Duct	West Pump Room Duct	101
Pb-B21	Green	Concrete	QA/QC Glycol Room	14
Pb-B22	**Yellow**	**Wood**	**QA/QC Laundry Room**	**20,500**
Pb-1-1	**Silver**	**Metal**	**Outside Bathroom Ext Window Frame**	**129,000**
Pb-1-2	**White**	**Plaster**	**Outside Bathroom Int Window Frame**	**1,420**
Pb-1-3	**Silver**	**Wood**	**Lobby Window Frame**	**1,110**
Pb-1-4	**Black**	**Wood**	**Lobby Window Frame**	**949**
Pb-1-5	**Beige**	**Wood**	**Lobby Window Ledge**	**852**
Pb-1-6	**Red**	**Wood**	**Exterior West Door**	**13,400**

Comments:

Sample collection & identification provided by EHS Partnerships Ltd.

Presently there are no regulations in British Columbia specifically addressing lead levels in paint. However employers, general construction contractors and trade contractors have the duty under the British Columbia Workers Compensation Act and the Occupational Health and Safety Regulations (OHSR) to protect workers from exposure to lead. Under Canadian Federal Law, paints containing greater than 90 ppm lead are considered lead-containing paint. However, this is a value to keep the lead concentration in surface coatings as low as possible and should not be confused with health based standards which correlates to acceptable blood lead levels.

When disturbing lead based paint, it is applicable to use the regulations set by the U.S. Department of Housing and Urban Development (HUD). HUD classifies lead-based paint as any paint application containing at least 1.0 milligram of lead per square centimeter of surface area (mg/cm^2), or 5000 ppm lead by weight, tested by chemical analysis. Further studies conducted by the U.S. Occupational Safety and Health Association (OSHA) have been done on the removal of materials with lead based paints. Improper removal techniques of lead-based paints containing greater than 600 ppm have been shown in these studies to exceed 50% of the Occupational Exposure Limit (OEL) of airborne lead particulate. As per section 6.60 of the OHSR *The employer must develop and implement an exposure control plan meeting the requirements of section 5.54 if workers are or may be exposed to lead in excess of 50% of the exposure limits, or if exposure through any route of entry could result in elevated lead body-burdens, as defined by the Board.*

The British Columbia Environmental Management Act – Hazardous Waste Regulations [B.C. Reg. 63/88 inc. amendments to Reg 179/2016] (HWR) are regulations set out to protect the environment from hazardous materials. The present requirement under HWR is to prevent the release of lead into the environment. Disposal of leachable lead-based products is outlined in the Lead-Containing Paints and Coatings Guidelines, issued by Work Safe BC. Table 1 of the HWR classifies leachable lead-based products as any application containing at least 5.0 milligrams of leachable lead per Litre (mg/L), tested by TCLP analysis.

Recommendations

Exposure control plans should be developed and implemented for all procedures that are likely to impact surface-coatings with a lead concentration greater than 600 ppm.

Analytical Parameters:

Method Used: Polarized light microscopy using dispersion staining (EPA/600/R-93/116).

Analysis perform

APPENDIX IV

HERITAGE CHARACTER STATEMENT

92-79

Kootenay National Park, British Columbia
Aquacourt
Radium Hot Springs Townsite

HERITAGE CHARACTER STATEMENT

The aquacourt at Radium Hot Springs was constructed between 1949 and 1951 to a design by Ernest T. Brown, architect. Alterations to the building between 1966 and 1968 aimed to accommodate the increasing numbers of visitors, and included the penthouse restaurant wing, a second bridged walkway to the rooftop terrace, and the reworking of interior spaces. Parks Canada is the custodian. See FHBRO Building Report 92-79.

Reasons for Designation

The aquacourt was designated Classified for its architectural value, its environmental significance, and its historical associations.

The Radium Hot Springs aquacourt was the first major post-war building project in the western parks. Its modernist design, inspired by the International style, heralded a shift away from the rustic aesthetic that had dominated National Parks design philosophy since the system's inception in the 1880s.

One of three operational hot springs facilities within the National Parks system, the Radium Hot Springs and aquacourt have played a primary role in the development of Kootenay National Park and in the establishment of the townsite. The townsite was completely redeveloped over a 20 year period beginning in the early 1950s in response to highway reconstruction and increased aquacourt visitation.

Built to make use of the naturally occurring hot springs as well as the cooler water of Sinclair Creek, the aquacourt facility is a major landmark within the national parks system, and within south-west British Columbia.

Character Defining Features

The heritage character of the Radium Hot Springs aquacourt resides in its modernist design, the nature of its materials, and its relationship with the creek, pools and hot springs in its dramatic setting in the basin of a gorge.

The building is "U"-shaped and symmetrical in plan, wrapped around the front and central rectangular "cool" pool. The overall massing is asymmetrical but visually balanced.

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The design of the aquacourt is inspired by the International style, which is characterized by strong horizontal lines, smooth surfaces and a clear expression of the structural grid. In the design of the aquacourt, the influence of the International style is seen in the projecting concrete roof and floor plates articulated as continuous eaves, the ribbed metal flashings along the eaves, the strip windows and glazed curtain walls, the aluminum window frames, and stainless steel parapet railings. Other features include the exposed concrete at columns and floor plates, the flat roofs and folded plate pavilion roofs, and the exterior penthouse level breezeway. Although identifiably of a later date, the lightness and transparency of the pavilion-roofed restaurant wing complements the established architectural vocabulary of the original building.

Reinstating the original tripartite strip window pattern and returning the main entrance to a recessed and symmetrical configuration would greatly enhance the clean, crisp lines of the building. Similarly, the original railing details should be retained, and reinstated where required. Any repair work should match the original; new construction should be compatible with the established palette of materials and techniques.

Functionally, the building is divided by floor level into three zones. The penthouse level is the most public, consisting of the main entrance and ticket area, restaurant and souvenir concession, and the outdoor rooftop terraces. The main level contains the change rooms, massage therapy clinic, and entrances to the hot and cool pools.
Service and storage areas are contained in the basement. This arrangement of spaces and functions has proven effective and should be respected.

Situated in the basin of the Sinclair Canyon and at the base of Redstreak Mountain, the building's relationship to its site remains virtually unchanged since the early 1950s. Site circulation is heavily influenced by the pedestrian bridges to the main entrance and to the upper deck and restaurant, and rooftop terraces reinforce the connection between the landscape and building. The back of the building (south elevation) straddles Sinclair Creek which was diverted to pass through the basement of the building.
Existing site relationships should be respected.

1995.01.25

For further guidance, please refer to the *FHBRO Code of Practice.*

APPENDIX VI

PREAPPROVED ROUTINE IMPACT ASSESSMENT FRONTCOUNTRY AREAS

Preapproved Routine Impact Assessment Frontcountry Areas

Parks Canada National Office
IAA 2019

Preapproved Routine Impact Assessments (PRIA) are pre-determined environmental management and mitigation measures for a defined class of routine, repetitive projects or activities with well understood and predictable effects. Approved PRIAs are an acceptable Impact Assessment pathway as they fulfill Parks Canada's obligations under the *Impact Assessment Act* (IAA) as a manager of federal lands.

This PRIA applies to the modification, maintenance, repair, replacement, decommissioning or abandonment of buildings or other structures that are carried out on developed land that is accessible by road within a national historic site including historic canals or any area of a national park that is zoned "Zone IV" or "Zone V" in accordance with the management plan for the site.

Construction or expansion of buildings and parking lots are not included in this PRIA, however, installation of other structures is permitted.

Buildings or other structures include, but are not limited to, playgrounds, staff offices, washroom facilities (e.g. dry and flush toilets, showers), service lines, trailhead area amenities, cook shelters, staff kiosks and accommodations or storage sheds. Examples of other structures that meet the scope of this PRIA are: sidewalks, boardwalks, pathway, fences, railings, electric vehicle charging stations, class B pedestrian bridges, generators, interpretive displays and exhibits, fireplaces or monuments.

Service lines include underground and aboveground service lines for water, sanitary waste, storm water, natural gas, power and communication. Utilities (water, sanitary sewer, storm water, natural gas) that are provided in pipes are usually located under roadways.

Developed land is a land that is permanently altered from its natural state for human use or is landscaped and maintained for human use.

Expansion is an increase in the exterior dimensions or the production capacity of a physical work.

Water body includes a lake, a canal, a reservoir, an ocean, a river and its tributaries and a wetland, up to the annual high-water mark, but does not include sewage or waste treatment lagoon, a mine tailings pond, an artificial irrigation pond, a dugout or a ditch that does not contain fish habitat as defined in subsection 2(1) of the *Fisheries Act*.

High water mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans Canada, 2015.) Upper Controlled Water Elevation (UCWE) is used as definition of high water mark in managed waterways.

Scope of Application:	This PRIA includes: • Modification, maintenance, repair, replacement, decommissioning or abandonment of buildings. • Installation, modification, maintenance, repair, replacement, decommissioning or abandonment of other structures. • Construction, installation, maintenance, repair, decommissioning or abandonment of sidewalks, boardwalks, fences or railings. • Replacement, rehabilitation, maintenance, repair, decommissioning or abandonment of existing service lines. • Construction or burial of hook-up power lines.

Conditions and Exceptions:	This PRIA does not apply under the following exceptions/conditions:
	
	Location:
	• In backcountry or in zone I, II, and III
	• Project results in residual adverse effects to sensitive natural or cultural resources (e.g., nests, dens and roosts, fish spawning areas, cultural resources, riparian areas, wildlife corridors, rare ecotypes, or areas of management concern)
	• Project involves the placement of temporary or permanent fill in a waterbody
	
	Buildings, other structures and service lines:
	• Projects that alter the purpose or function of or results in an expansion of a physical work
	• Projects that result in increased visitor capacity
	• Projects that involve historic buildings and/or structures, known archaeological resources or extant archaeological resources, unless the work has been pre-approved by a Parks Canada Cultural Resource Management Advisor and/or Archaeologist
	
	For modification, repair, replacement, decommissioning or abandonment projects:
	• Installation or modification of a septic field
	• Cutting or removing trees through the use of heavy equipment (e.g. skidders, harvesters or excavators)
	
	General:
	• The project permanently alters the characteristics of a water body (e.g., temperature, pH, turbidity, flow, water level, water body bed).
	  ○ This includes fill placed in a water body or permanently increasing a physical work's footprint below the high water mark; dredging; and construction of a permanent diversion channel.
	
	• The project results in **residual** adverse effects on migratory birds or their nests.
	  ○ Refer to the draft- *Parks Canada Guidance on Reducing Risk to Migratory Birds* and associated draft- *Conservation Measures for Minimizing Impacts to Migratory Birds During the Nesting Period*.

	• The project results in **residual** adverse effects on an individual, a residence or the critical habitat of a listed species at risk under the *Species at Risk Act*. ○ Determine if mitigations are needed to ensure no residual adverse effects to species at risk. Such mitigations should be included in the Supplementary Mitigations section. • The project is likely to require an approval[1] under the *Canadian Navigable Waters Act* (s. 5(1)). • The project is likely to require an authorization[2] under the *Fisheries Act* (s.35(1) or 36(3)). • The project involves the removal of or causes damage to cultural resources of heritage value, for example, heritage buildings designated by the Federal Heritage Buildings Review Office, archaeological sites, historical and archaeological objects, or cultural landscapes. • The project involves the removal of or causes damage to paleontological resources. • The project results in loss or reduction in size of a wetland. • The project adversely impacts sites of significance to Indigenous peoples or current access and use of areas where hunting, fishing or gathering rights are exercised by Indigenous peoples.
Other Considerations:	Use of the PRIA may not be appropriate in circumstances such as: • If the building, other structure or service line is in a zone susceptible to natural hazards such as a land slide zone, floodplain, or area vulnerable to storm surge and sea level rise or in natural, previously undeveloped areas.
Approved Geographic Areas of Application:	This PRIA may be used on developed land that is accessible by road within a national historic site including historic canals or any area of a national park that is zoned "Zone IV" or "Zone V" in accordance with the management plan.
Parks Canada Specialists:	Impact Assessment: If there are any questions on how to apply this PRIA, consult a member of the Impact Assessment Team. Species at Risk: If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the Species Conservation Team.

[1] Check if your project is a Major Works in any Navigable Water or Works in Navigable Waters Listed on the Schedule: https://www.tc.gc.ca/eng/programs-623.html

[2] Check if your projects needs a review: http://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/request-review-demande-d-examen-003-eng.html

	Environmental Management: If there are questions on environmental management issues (e.g., treated wood, contaminated sites, hazardous materials or greening operations), consult a member of the Environmental Management Team. Cultural Resources: If there is any uncertainty regarding potential adverse effects to known or potential cultural resources, consult a member of the Cultural Resource Management Protection Team or, if applicable, the local Field Unit specialist.

Valued Components and Effects Analysis

Soil/Land Resources	• Soil contamination from wastes (e.g., garbage, litter, sewage, fuel) • Increased disturbance footprint • Soil compaction and rutting • Soil erosion, loss of topsoil and exposure of subsoil • Change in slopes, landforms and landscape
Air/Noise Quality	• Temporary decreased ambient air quality (e.g., dust, equipment emissions) • Increased ambient noise level
Water Quality	• Reduced water quality due to transportation of debris and contamination (i.e. from leaks and accidental spills, etc.) • Localized changes to surface water hydrology
Wildlife and Vegetation	• Wildlife habituation/attraction to artificial food sources • Impeded/altered wildlife movement • Habitat destruction or alteration • Mortality from project activities • Introduction of invasive species, or expansion of existing populations • Damage to and removal of vegetation, disturbance of adjacent natural areas, root exposure and physiological distress
Visitor Experience and Safety	• Reduced quality of visitor experience due to noise and presence of construction equipment • Reduced accessibility to portions of the site where work is taking place • Hazard to visitors and staff due to construction activities
Cultural Resources	• Adverse effects to the heritage value or character-defining elements of a cultural resource or a heritage place • Impacts to archaeological resources (known or potential) from displacement or destruction, resulting in loss of heritage value • Impacts to cultural landscapes, buildings, objects, engineering works.

Mitigation Measures

Pre-Project Planning:

1) Work within the vicinity of waterbodies or wetlands may require a site specific Erosion and Sediment Control Plan.
2) Schedule work to avoid wet, windy and rainy periods or very dry periods that may increase erosion and sedimentation.
3) Clearly identify and avoid sensitive environmental features and habitats in the work area and schedule work to avoid critical wildlife life stages. If useful, complete the Environmental Timing Windows Table.
4) Work with a Cultural Resource Management (CRM) Advisor and CRM specialists (archaeologists, historians, and built heritage advisors) to assess the impact of intervention to cultural resources and identify necessary mitigation measures.
5) A Spill Response Plan should be developed prior to work starting.
6) Treated wood is prohibited in certain situations and must be handled, installed, and disposed of according to current guidance prepared by Parks Canada.

Example: Environmental Timing Windows Table (to be deleted or adapted)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fish	AVOID INSTREAM WORK					Least risk window for work in and around freshwater, June 15 – Sept 15				AVOID INSTREAM WORK		
Birds	Reduced risk for harm to birds			AVOID VEGETATION REMOVAL Bird Nesting Period: April - Mid August					Reduced risk for harm to birds			
Bats	Bat in Hibernacula				Bats Nursing Pups						Bat in Hibernacula	
Turtles	Hibernation		Road Mortality		Nesting -avoid disturbance		Road Mortality		Hatchlings – avoid disturbing	Road Mortality	Hibernation	
Snakes	Avoid disturbance of Hibernacula				Road Mortality	Peak : breeding, live young Mitigate road mortality				Migration Road mortality	Avoid disturbance of Hibernacula	

Work Site Conditions/Staging/Laydown:

7) Key contacts and their respective roles and responsibilities must be identified prior to work starting and communicated to all on-site workers.
8) People working on the project/activities must review the mitigation measures and any site specific considerations with designated Parks Canada staff before work begins.
9) Clearly mark the work site and restricted areas with stakes, biodegradable flagging tape or other means to minimize the disturbance footprint; remove when the project is completed.
10) Staging areas, material/equipment drop sites, and parking areas must be identified and within an existing disturbed footprint (e.g., roadways, gravel surface, previously disturbed areas with high resiliency) or approved by designated Parks Canada staff.
11) Use existing roadways, trails, disturbed areas or other areas as approved by designated Parks Canada staff for site access, travel within the site and construction activities.

Wildlife:

12) When possible, conduct any clearing of vegetation outside critical wildlife timing windows such as the bird nesting period and bat maternity season.
13) On-site workers must receive any required wildlife awareness training, according to field unit policy.
14) On-site workers must be made aware of and subsequently report any incidental sightings of species at risk immediately to designated Parks Canada staff.
15) If active nests, dens or roosts are discovered, stop work and contact designated Parks Canada staff immediately for direction.
16) When possible, conduct activities during daylight hours, avoiding critical foraging times (dusk and dawn). Consult with Parks Canada staff for site-specific advice.
17) Minimize the time excavations remain open and cover or fence when left unattended to reduce the potential for wildlife injury.
18) Never approach or harass wildlife (e.g., feeding, baiting, luring). If wildlife is observed at or near the work site, allow the animal(s) the opportunity to leave the work area.
19) Designated Parks Canada staff must be alerted immediately to any potential wildlife conflict (e.g., aggressive behaviour, persistent intrusion), distress or mortality.

Vegetation:

20) All clearing activities must be flagged and plans pre-approved by designated Parks Canada staff.
21) Clear minimum area necessary; trees should be removed only if necessary for project completion or visitor/staff safety.
22) When felling trees, precautions must be taken to minimize damage to surrounding vegetation.
23) The felling of trees with obvious wildlife use (e.g., snags with cavity nests, large trees with stick nests) must be avoided wherever possible; if unavoidable, Parks Canada staff consultation and approval is required.
24) All cut wood is the property of Parks Canada; consult with designated Parks Canada staff to determine appropriate cutting methods, use and disposal of cut wood and other plant material.
25) Employ pruning techniques to minimize risk of tearing the bark and harming the tree; ensure that only branch tissue is removed and stem or trunk tissue is left undamaged (refer to Appendix A).
26) Protect roots of trees to drip line to prevent disturbance or damage. Avoid traffic, dumping and storage of materials over root zone.
27) Retain a 15-30 meter vegetated buffer, from the high water mark of waterbodies. In sloped areas, buffers should increase in width as the slope increases.
28) Removal of riparian vegetation should be kept to a minimum and undertaken only when absolutely required. Ensure the root structure and stability are maintained.
29) Where re-vegetation is required, use native plants/soils/seed mix approved by designated Parks Canada staff.

Invasive Alien Species:

30) All construction equipment from outside the Parks Canada protected heritage place must be washed outside the site prior to arrival to minimize risk of introducing invasive weed species. Proof that this mitigation was applied may be requested before equipment is permitted into the protected heritage place.
31) If invasive species are a serious issue, consider more effective cleaning methods such as pump and high pressure hose or high pressure water unit.

32) Work in uninfested sites before moving to infested sites.
33) All soil, gravel, untreated construction lumber, erosion and sediment control products or other applicable materials from outside the protected heritage place must be approved by the designated Parks Canada staff.
34) Organic material (e,g, topsoil, borrow and fill material, gravel) taken from the construction site will not be used in other parts of the protected heritage place unless approved by the designated Parks Canada staff.
35) Minimize ground disturbance, vegetation removal and bare soil exposure (e.g., cover stockpiled material with tarps, plant native species, cover with natural mulch/ground coverings).
36) Stabilize and re-vegetate disturbed areas as soon as possible. If there is insufficient time remaining in the growing season, stabilize the site to prevent erosion and vegetate the following spring.
37) Monitor disturbed and re-vegetated areas until native vegetation is growing successfully and invasive alien species spread is prevented.

Visitor Experience and Safety:

38) If possible, schedule noisy activities outside peak visitor season or adjust hours of noisy work to minimise disturbance to visitors using the area.
39) Close and mark the work site and safety hazards with appropriate signage while active construction, repair or maintenance is underway; consider temporary detours or reroutes as appropriate.
40) If closing the area is not possible, maintain a safe working distance between work activities and visitors. If traffic control is required, a flag person should manage traffic through the construction/hazard area.
41) Visitor access trails and roads outside the construction area must be free of construction materials, waste, machinery and equipment.

Cultural Resources:

42) The designated Parks Canada staff should ensure that on-site workers receive appropriate cultural resource awareness training if required.
43) Avoid known potential cultural resources and archaeological sites.
44) Apply additional mitigation measures (in supplementary mitigation section) that may have been previously identified by a Parks Canada archaeologist or cultural resource advisor for the immediate area of work.
45) If cultural resources (i.e., structural remains and/or artifact concentrations) are encountered, work must cease in the immediate area, the site secured and the designated Parks Canada staff contacted for further direction.

Equipment Operations:

46) Use low pressure or rubber tracked equipment or access matting where feasible to minimize soil compaction and ground disturbance.
47) Select equipment appropriate to the nature of work being conducted (e.g., avoid using large scale machinery when hand tools or smaller scale machinery could be used).
48) Heavy equipment operating on paved surfaces should be equipped with street pads; damage to paved surfaces must be restored to original conditions.

49) Equipment must be properly tuned, clean and free of contaminants, in good operating order, free of leaks (e.g., fuel, oil or grease), and fitted with standard air emission control devices and spark arrestors prior to arrival on site.
50) Machinery must be stored, maintained and refuelled on a flat surface, outside the dripline[3] of trees and above the High Water Mark and in such a way as to prevent any deleterious substances from entering the water. Increase the buffer zone depending on the level of risk and site-specific conditions.
51) Refuelling must take place on an impermeable fuel mat with a berm or within a container. Leaks and spills during refuelling must be cleaned up, reported and contaminated materials must be disposed of appropriately. Fuel must never be dispelled or deposited into the environment or any water body.
52) Any required cleaning of tools and equipment should be done off-site. If it must be on-site, it must be in an appropriate area at least 30m from a waterbody.
53) Gas generators must be secured to prevent movement during the operation and set up on an impermeable fuel mat with a berm or within a container that can contain 110% of the volume of fuel in the generator.

Demolition:

54) Prior to commencement of demolition activities, all structures must be surveyed by experienced personnel from within or approved by Parks Canada for the presence of wildlife (e.g., roosting bats, nests, dens). Should wildlife be discovered, work will cease in the immediate area and designated Parks Canada staff contacted for further direction.
55) Prior to commencement of demolition activities, water and septic systems, lines and/or fields must be identified and precautions taken during the operation of heavy equipment to avoid damaging them.
56) Residual septic systems, water lines and wells of no further use must be removed, capped or decommissioned according to the appropriate federal or provincial legislation.
57) If undocumented contamination is found, cease work immediately and contact designated Parks Canada staff.
58) Consult with designated Parks Canada staff to determine whether full excavation and removal of all subsurface infrastructure (e.g., pipes, cement structures, wires) is required. Backfill any excavation with clean, weed-free topsoil.
59) Ensure wastes from demolition activities do not enter waterbodies (e.g., use tarps to capture debris). Any waste that does fall into a waterbody will be immediately retrieved, provided worker safety is not compromised, and if removal can be done without excessive disturbance of bottom sediment.

Site Clean-up and Waste Management:

60) All wildlife attractants must be secured (e.g., petroleum products, human food, recyclable drink containers and garbage) in wildlife-proof containers, a secure building or vehicle. When possible, keep food waste separate from construction waste and remove daily.

[3] The area defined by the outermost circumference of a tree canopy where water drips from and onto the ground.

61) All salvageable, non-combustible and non-hazardous materials will be removed, reused and recycled to the greatest extent possible. Remaining material considered to be waste and demolition debris is to be disposed of at an approved disposal facility.
62) Secure all materials (e.g., construction waste and materials, excavation, vegetation) above the high water mark of nearby waterbodies and ensure wastes do not enter waterbodies (e.g., use tarps to capture debris). Any waste that does fall into a waterbody will be immediately retrieved, provided worker safety is not compromised, and if removal can be done without excessive disturbance of bottom sediment.
63) Contain wastes and transport to an approved waste landfill site outside the Parks Canada site unless otherwise directed; cover waste loads during transportation.
64) Any hazardous material (e.g. asphalt shingles, creosote treated wood, asbestos, lead paint, moulds, animal excrement, paints, automotive products, electrical equipment) and pollutants such as fuels and solvents found on-site will be separated and dispose of contaminated materials at provincially or territorially certified disposal sites.
65) All construction materials must be removed from the site on project completion. Burning or burying is not permitted unless approved by Parks Canada.
66) Concrete mixing activities must take place over tarps and a minimum of 30 meters from waterbodies. Fresh, wet, uncured concrete and concrete dust must not come into contact with waterbodies. Secondary containment measures such as collection/drip trays and berms lined with air and water-tight material such as plastic and a layer of sand, and double-lined fuel tanks are required.
67) Excess concrete must be disposed of at an appropriate facility outside of the Parks Canada protected heritage place. If excess concrete from pump trucks must be dumped prior to transport outside the protected heritage place, it must be deposited in a location approved by Parks Canada and removed following hardening for disposal at an approved facility.
68) If present, portable sanitary facilities must be serviced on a regular basis and accumulated waste disposed of at a sanitary waste disposal facility. The portable facilities must have sufficient capacity and be managed to ensure waste is not discharged to the receiving environment.

Spill Response Plans and Hazardous Material Management:

69) Ensure that all on-site workers receive a briefing about the Spill Response Plan and are aware of the location and use of spill kits and containment devices.
70) Follow all applicable regulations and codes for the management and handling of hazardous waste.
71) Spill containment equipment must be present on-site. A spill contingency response kit including sorbent material and berms to contain 110% of the largest possible spill related to the work must be available on site at each location of potential spills (sites where equipment is working and at refuelling, lubrication, and repair locations).
72) All spills must be contained and cleaned-up as soon as it is possible to safely do so. In the event of a major spill, all other work must stop until the spill has been adequately contained and cleaned up.
73) Notify the designated Parks Canada staff and the emergency contact immediately of any spill. In the event of a major spill, call the first contact authority.
74) Contaminants must be recovered at the source and disposed of according to applicable laws, policies and regulations site (consult with the Environmental Management Team). The site will be inspected by Parks Canada staff to ensure completion to expected standards.

75) Petrochemical products, paints and chemicals must be used and stored in such a way as to prevent any deleterious substances from entering the water.
76) If hazardous waste or potentially contaminated material is uncovered during excavation / construction, work must stop and excavated materials must be secured onsite in a manner that prevents contamination of the surrounding environment, including leaching. The designated Parks Canada staff must be contacted for further direction.

Trenching and Excavation:

77) Erosion control measures that prevent sediment transport into any waterway, water body or wetland shall be implemented.
78) Select erosion and sediment control measures that correspond with the nature and duration of the project and they must be installed before starting work, especially within 30 meters of a waterbody.
79) Regularly inspect and maintain erosion and sediment control structures during all phases of the project and alter measures when necessary.
80) Use erosion and sediment control products made of 100% biodegradable materials (e.g., jute, sisal or coir fibre) when possible. Ensure backing materials are also biodegradable.
81) Use of hay or straw in erosion and sediment control must be approved by designated Parks Canada staff.
82) Use sediment and erosion control products that reduce potential for wildlife entanglement[4] when possible. These options include:
    a) Net-less erosion control blankets made of excelsior or loose mulch and unreinforced silt fences.
    b) Netting with a loose-weave wildlife safe design.
83) Limit duration of soil exposure; phase activities whenever possible and restore disturbed areas as soon as possible.
84) Avoid equipment operation on steep or unstable slopes unless absolutely necessary.
85) Manage water flowing onto the site as appropriate for the project:
    a) Divert uplands surface runoff away from exposed areas.
    b) Filter water being pumped/diverted from the site; silt-laden water must not be pumped directly into a waterbody (e.g., pump/divert water to a vegetated area 30 meters from the waterbody, a constructed settling basin or other filtration system).
    c) Minimize slope length and gradients of disturbed areas.
    d) Cover erodible soils with mulch, vegetation, or rip rap.
    e) Construct check dams or similar devices in constructed swales and ditches.
86) Any trenches to be dug for services e.g., electrical lines, must follow an existing “right of way” as much as possible.
87) Topsoil separation is required; stockpile topsoil away from subsoil and spoil material and above the high water mark or top of bank of nearby waterbodies and ensuring sediment re-entry to the watercourse is prevented.
88) Stockpiled material must not be permitted to damage or bury known cultural resources.
89) Reuse excavated material on site, unless there are any indicators of potential contamination.

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[4] Source: http://www.coastal.ca.gov/nps/Wildlife-Friendly_Products.pdf

90) Excavations must be drained (but not directly into a waterbody), backfilled and compacted as soon as possible.
91) Under thawed conditions, backfill material will be compacted prior to topsoil replacement; distribute topsoil over the excavated area.
92) Under frozen ground conditions, material will be sufficiently spread over the excavated site to allow for a settlement under thawed conditions
93) Re-vegetation must be undertaken in consultation with designated Parks Canada staff.
94) Maintain effective sediment and erosion control measures until any required re-vegetation of disturbed areas is achieved.
95) Remove temporary erosion and sediment control products, especially non-biodegradable materials, when they are no longer required.

Supplementary Mitigations:

96) A few supplementary mitigation(s) may be required to ensure all potential impacts are mitigated.

Approvals

Original signed by Julie Tompa	Dec 13, 2019
Julia Tompa Director, Natural Resource Management Branch	Date
Original signed by Kalvin Mercer	*Dec 9, 2019*
Kalvin Mercer Director, Asset Management and Project Delivery Branch	Date

References:

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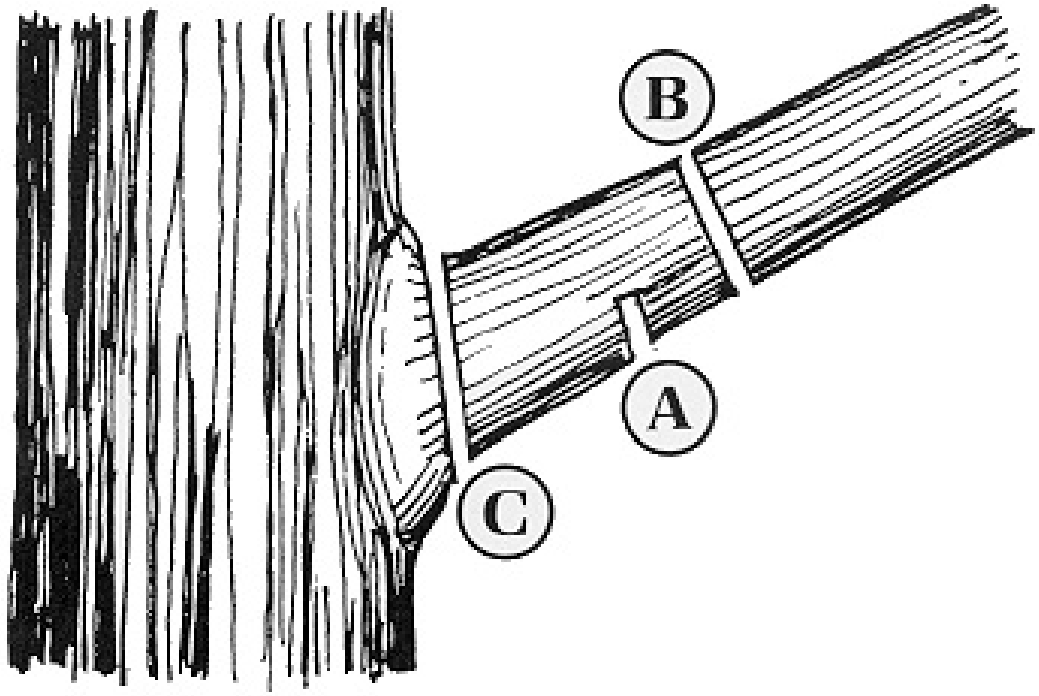
Appendix A – Proper Pruning Method



To find the proper place to cut a branch, look for the branch collar, an often visible swelling that forms at the base of a branch where it is attached to its parent branch or to the tree's trunk. On the upper surface, there is usually a branch bark ridge that runs (more or less) parallel to the branch angle, along the stem of the tree. A proper pruning cut does not damage either the branch bark ridge or the branch collar.

A – The first cut is a shallow undercut to prevent bark tearing.

B – The second cut completely removes the limb.

C – The third cut removes the stub and is cut flush with the branch collar

APPENDIX VII

GUIDANCE ON THE MANAGEMENT AND PROTECTION OF BARN SWALLOW NESTS IN PARKS CANADA PLACES

28 May 2020

Guidance on the Management and Protection of Barn Swallow Nests in Parks Canada Places

Context

Barn Swallows are in decline, faced with threats including declining insect populations and loss of nesting and foraging habitats (primarily due to modernisation of farming). Parks Canada can support the recovery of this species, as it is regularly found in many Parks Canada Places (including a large number of National Historic Sites) in all provinces and territories, except Newfoundland and Nunavut.

Barn Swallows were listed on Schedule 1 of the *Species at Risk Act* (SARA) as *Threatened* on November 15, 2017, triggering legal protection mechanisms under SARA for individuals and residences (i.e., nests). A residence description for this species was posted on the Species at Risk Public Registry on May 14, 2019.

The description states that a Barn Swallow nest, occupied or not, is considered a residence and protected from damage or destruction:

- in provinces: from May 1st or the date when adults are first seen building or occupying the nest, whichever is earlier, to August 31st or the date when a bird is last seen at the nest, whichever is later.
- in territories: from May 15th or the date when adults are first seen building or occupying the nest, whichever is earlier, to August 31st or the date when a bird is last seen at the nest, whichever is later.

Barn Swallow nests are also protected under the *Migratory Bird Convention Act* (MBCA). Proposed modernizations of the MBCA regulations (June 2019), when finalized, may clarify that the protections under the MBCA do not apply to unoccupied Barn Swallow nests.

Barn Swallows often build their nests on built assets (e.g. buildings, bridges, road culverts). While this generally does not impact Parks Canada operations, in some situations this can create challenges related to maintenance, renovation, replacement or demolition of built assets and/or create concerns related to public health or safety. In the event that avoiding damage or destruction of Barn Swallow nests is not feasible, this document outlines the Species Conservation (SC) team's advice on the management and protection of Barn Swallow nests in Parks Canada Places. This advice has been developed in consultation with Environment and Climate Change Canada, who administrate the MBCA throughout the country, and who leads the development of the residence description for Barn Swallows.

Advice

Barn Swallow nests should always be left intact and in place whenever possible, even outside of the breeding season. However, situations sometimes arise where it is not feasible to allow Barn Swallows to nest in a particular location, either due to public health or safety concerns or due

to necessary activities that would result in incidental[1] damage or destruction of the nest (e.g., building renovations). If a Barn Swallow is likely to initiate construction of a nest in a location where it is not feasible to let the species nest, install deterrents (e.g., wire mesh) outside of the time periods during which nests are considered a residence to prevent nesting in this location. If nests from previous years already exist in this area, consider nest removal outside of the above time periods during which it is considered a residence, to reduce the attraction of the site.

Always leave Barn Swallow nests intact and in place when possible, even outside of the active season

If a Barn Swallow is placing nesting material (mud) / initiating the construction of a nest in a location where it is not feasible to let the species nest, remove the mud during the early stages of construction before it becomes occupied (before the adult can sit on the nest). Remove the mud often (e.g., may need to be done daily or more than once per day), to encourage the bird(s) to nest elsewhere. Consider using deterrents (e.g., wire mesh) after removal, to discourage birds from nesting in the same spot in the future. Note that, as soon as a bird starts building a nest, it is considered a residence, and SARA permitting conditions must be met to remove it. Please get in touch with your Species Conservation permitting contact for support documenting how you meet permitting conditions for wiping down nesting material.

If a Barn Swallow nest is already built and occurs in a location where it is not feasible to let the nest remain, assess whether the nest is occupied or not. If unoccupied (no adults sitting; no eggs, chicks or fledglings), the nest can be removed without a permit. If the nest is occupied, avoid damaging or destroying it, or harming or harassing the birds, so that they may successfully raise their young. A link to guidance on conducting construction activities in close proximity to nests is provided in the Additional Resources section below.

In conjunction with the use of deterrents and/or the removal of unoccupied nests in the situations described above, in locations where habitat may be limited, consider building housing designed specifically for Barn Swallows to provide alternate nesting locations. This can include simple low-cost nest ledges placed in suitable locations on buildings and other structures, or free-standing nesting structures specifically built for Barn Swallows.

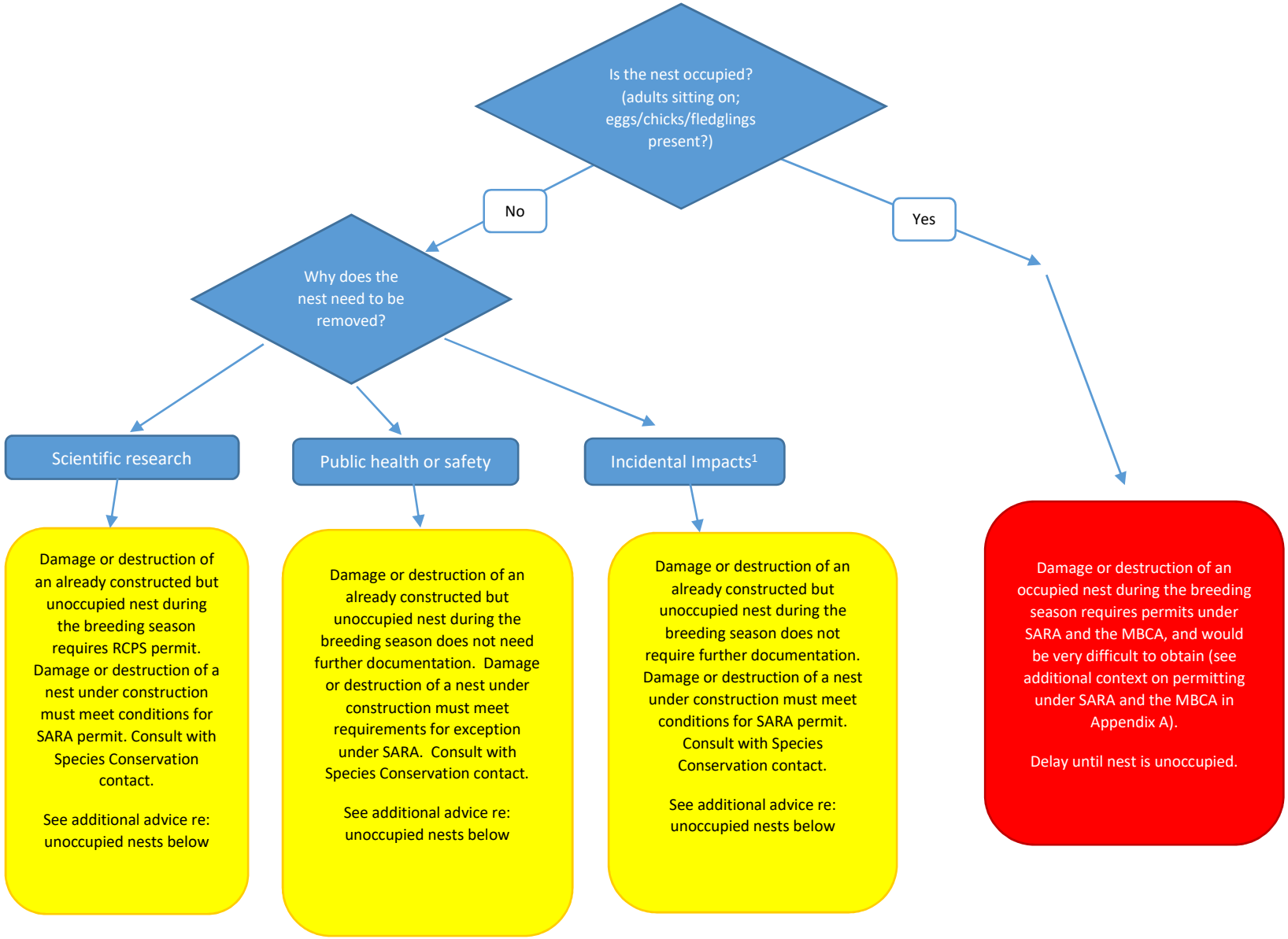
Again, it is always advisable to leave Barn Swallow nests intact and in place when possible, both within and across seasons, since the same nest may be used for multiple years. If it is not possible to avoid damage or destruction of a nest that is under construction or occupied, the

[1] Incidental refers to situations where the activity being undertaken could result in the *inadvertent* damage or destruction of a Barn Swallow nest. Take the case of a building being renovated so it can accommodate more people. The intent of the activity is to renovate a building to increase its capacity and is not aimed at damaging or destroying Barn Swallow nests. However, the activities involved in the renovation could result in the inadvertent damage or destruction of Barn Swallow nests.

flowchart below can be used to further understanding permitting considerations and guide decision-making.

Additional information on permitting under SARA and the MBCA is provided in Appendix A, and additional information on application of this advice is provided in Appendix B.

Flowchart: Permitting advice when considering removing a Barn Swallow nest from a location that could be problematic to the birds in the immediate future (e.g., construction activities will destroy the nest or disrupt breeding / raising of chicks) or could cause public health or safety issues (e.g., nest built over a food preparation area). This advice applies during the breeding season when a nest is considered a residence under SARA (see Residence description on first page). No permit is required to remove an empty nest outside the breeding season. Recommend consultation with the SC team early in the process and prior to contacting ECCC about permit requirements.



Additional Advice Regarding Unoccupied Nests

If possible, leave unoccupied nests in place and intact because they could be used again in future years. If damaging or destroying unoccupied nests in areas where habitat for Barn Swallows is limited, consider providing provide alternate nesting locations to replace lost habitat / nesting locations, for example:

- if removing nests while replacing a bridge, consider providing nesting platforms on temporary bridge;
- if a building is being removed or blocked from nesting access consider building housing designed specifically for Barn Swallows

Additional Resources

- Parks Canada Guidance on Reducing Risk to Migratory Birds (draft) and Parks Canada National Best Management Practices: Minimizing Impacts to Migratory Birds During the Nesting Period (draft), both available on the Impact Assessment team's Guidance and Tools Intranet page.
- The Impact Assessment discussion forum is a good resource for information from Parks Canada staff on the use of deterrents and alternate housing for Barn Swallows.
- Additional information on SARA permits and exceptions is available on the Species Conservation Guidance and Tools intranet site
- The Species Conservation team can be contacted for additional advice and support.

Appendix A: Permitting under SARA and the MBCA

SARA allows permits to be issued for incidental adverse effects as long as certain conditions are met; however, the MBCA does not allow for permits to be issued for incidental[1] take. This conflict prevents permits for incidental effects to / take of occupied[2] Barn Swallow nests or residences from being issued (i.e., Parks Canada cannot issue a permit under SARA that would constitute incidental take under the MBCA).

Permits required for purposes of scientific research relating to the conservation of Barn Swallows can be issued under both SARA and the MBCA as long as the permitting conditions of each Act are met. Now that Barn Swallows are listed under SARA, it will be very rare for ECCC to issue research permits for the damage or destruction of occupied nests, and it may be difficult to meet all of the pre-conditions for permits under s73 of SARA (e.g., the condition to implement reasonable alternatives to reduce the impact on the species).

In addition, both SARA and the MBCA and its associated Migratory Birds Regulations (MBR) have provisions for activities required for public health or safety; however, the provisions are quite different between the two Acts. Permits related to public health or safety that may be issued under the MBCA are referred to as Damage or Danger permits. These are only issued if it is necessary to reduce the damage or danger that migratory birds are causing or are likely to cause to health, safety, agriculture or other interests in a particular community (MBR s.26.1(1), MBCA s26.1(1)). Note that such a permit under these regulations (made pursuant by the MBCA), requires that the damage or danger be caused by the birds themselves, for example, one or more Barn Swallows nesting inside a business or residence that is used to prepare food, or one or more Barn Swallows are nesting in a high traffic area and producing enough droppings to cause a slipping hazard. This is a notable difference from SARA, which does not require the public health or safety concern to be caused by the birds.

[2] In June of 2019, proposed changes to the MBCA regulations were posted (http://gazette.gc.ca/rp-pr/p1/2019/2019-06-01/html/reg3-eng.html) and include an exception to the prohibitions against damaging, destroying, disturbing or removing unoccupied nests of most species of migratory birds, including swallows. Therefore, when finalized, permits for activities that damage or destroy unoccupied Barn Swallow nests will no longer be required under the MBCA.

Appendix B: Application of the Advice

This advice applies to Parks Canada operations within Parks Canada Places. It is Parks Canada's responsibility to meet SARA and MBCA protection and permitting requirements within our protected places, and the SC team can provide advice and support on this process. The authority for issuing permits under the MBCA within Parks Canada Places rests with ECCC.

If activities are being conducted by non-Parks Canada staff in Parks Canada Places (e.g., researchers, businesses, residents, contractors), the SC team recommends that field units incorporate this advice and the context for it into their communications and any permissions and/or permits granted (e.g., under SARA and the *Canada National Parks Act*). However, the responsibility to meet SARA and MBCA protection and permitting requirements ultimately rests with the person conducting the activity.

Any operations affecting Barn Swallow nests that the Agency conducts on lands that we do not own should be discussed with the SC team because the application of SARA and the MBCA can vary depending on who is responsible for administrating the Acts on those lands.

Note that this advice pertains to Barn Swallow nests only. Any other issues relating to the protection of migratory birds listed under SARA and their nests should be discussed with the SC team.

APPENDIX VIII

GUIDELINES FOR INSPECTION OF TREES & BUILT ASSETS FOR BATS

Guidelines for Inspection of Trees and Built Assets for Bats

Parks Canada Agency

Mount Revelstoke and Glacier National Parks

March, 2019

Prepared by Jennifer Greenwood, adapted from the following resources:

- Draft Parks Canada Resource Management Guideline for Bats, Banff Field Unit, Prepared by Eric Knight, Greg Horne & Geoff Skinner (2017)
- Pre-Construction Bat Roost Survey Guidelines for Projects Requiring Tree Removal from April to September – Banff Field Unit, Prepared by Helen Dickinson (2016)
- Fundy National Park Guidance for Inspecting Built Assets for Bats (2016)

1. PURPOSE/BACKGROUND:

The purpose of this document is to provide guidelines for inspecting built assets and trees to determine whether bats are present prior to maintenance, alteration, or removal of vegetation (trees), buildings, and structures. Inspections will often be a part of the Impact Assessment process and these protocols are referred to in the following best management practices (BMP's)

- Best Management Practice 10.00 for Management of Bats in Built Assets
- Best Management Practice 01.03 Vegetation Removal
- PCA/MRGNP Decision tool for dealing with bats in built assets

Bats in BC There are 16 species of bat in BC, 12 of which are known to occur in the region of BC where Mt. Revelstoke and Glacier national parks are situated (Holroyd et al 2016, Kellner 2017, Wildlife Conservation Society 2017). Of these, eight have been detected in MRGNP through acoustic surveys and one (Little Brown Myotis) confirmed through capture. Two of these species are listed as endangered in schedule 1 of the Species at Risk Act (SARA). These are the Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*).

The SARA offers protections for listed species from the following (s. 32, 33, & 38):

- The killing, harming, harassing, capture, or taking of an individual
- The possession, collection, buying, selling, or trading of an individual or any part or derivative of an individual;
- The damage or destruction of the residence of one or more individuals, or their critical habitat

Bats use of trees and buildings

Use of trees:

- May be used as maternity roosts
- May be used as day roosts by males or non-breeding females
- In some species, may be used as hibernacula
- Bats may roost in any type of tree cavities, under loose bark, hollow trunks, or overhanging root wads

The use of trees by bats will often be during the same time period as when they are used by migratory birds, so in many cases, abiding by the Migratory Birds Convention Act (1994) and its regulations will also be in compliance with the regulations regarding destruction of residences under the SARA.

Use of buildings:

- May be used as maternity roosts
- May be used as day roosts by males or non-breeding females
- May be used as hibernacula by some species where temperatures are mild

- Many parts of built structures may be used including attics, eaves, under shingles and siding, behind shutters, in cracks in walls or chimneys, flashing, rafters, cellars, etc.

For a comprehensive description of bat roosting habitat, refer to Section 4 of the BC Ministry of Environment Best Management Practices Guidelines for Bats in British Columbia, Chapter 1 (Holroyd et al. 2016) and Tables 3 - 5 in Appendix B.

Rationale for inspections

Inspections are required to identify if bats are present prior to maintenance or removal of built assets and trees. All species of bats and their residences are protected from harm under the National Parks Wildlife Regulations (s.4), so it is necessary to know if bats are present prior to work occurring so the appropriate actions and mitigations can be taken.

SARA considerations: A bat maternity roost, whether in a tree or built asset, is considered a residence, and hibernacula are considered critical habitat under SARA (2002). Therefore, any built asset or tree identified as a maternity roost or hibernacula is protected from harm or destruction under SARA and will require the appropriate mitigations or authorization pathway as indicated in the BMP's and PCA decision tool for dealing with bats in built assets.

2. SCOPE:

The intended audience of these inspection guidelines is Parks Canada staff and external contractors who are conducting inspections for bats. This document has been developed to provide protocols for conducting inspections of built assets and trees, when it is proposed that maintenance, alteration, or removal of these structures will occur, and/or vegetation removal as described in the BMP for built assets (10.00) and for vegetation removal (01.03). Examples of this may include:

- repair of building envelope, interior renovations, or expansion of building footprint
- tree clearing for construction purposes, hazard/danger tree removal, tree removal for firesmart protection of built assets, and trail work
- any other situation that occurs wherein the determination needs to be made as to whether bats are present.

For MRGNP, roosts may be active between 1 April and 1 September. The primary guidance given to proponents is to undertake work on built assets or to conduct tree removal outside of this period; however when work must be completed within this period, the BMP's for built assets (10.00) and vegetation removal (01.03)) must be followed if bats are suspected in the structure in question.

3. EXCEPTIONS:

This document does not pertain to the inspection of mines and caves, nor does it deal with guidelines surrounding prescribed fire in relation to occupancy of trees by bats.

4. GENERAL INSPECTION PROTOCOLS:

1. Consult the Impact Assessment (IA) Scientist or Impact Assessment Officer (IAO) for the project to arrange for assistance setting up an inspection for bats.
2. Unless otherwise indicated, a QEP must conduct the inspection.
3. Safety: staff who are conducting building inspections have the potential to come in to contact with hantavirus, histoplasmosis, mould, and asbestos. Those who may come in to direct contact with bats may also be exposed to rabies or tetanus.
    i. Any staff with the potential to come in to contact with bats must have up-to-date rabies and tetanus vaccines. Rabies vaccinations consist of three immunizations on specific days (day 1, day 7, day 22), and antibody levels can be assessed with a titre check every 1-2 years.
    ii. A respirator and gloves should be worn while inspecting buildings
    iii. Staff conducting inspections should be familiar with and adhere to the following Safe Work Practices:
        a. Handling and disposing of wildlife
        b. Exposure to Hantavirus
        c. Dealing with Problem Wildlife
        d. Wildlife and Fish Capture and Release
        e. Use of Ladders (Stepladders Straight/Extension, Combination and Fixed)
4. If you encounter an individual bat (dead or alive): contact the human-wildlife conflict specialist, and follow instructions in the MRGNP Guidelines for Encounters With Bats
5. Inspections should be conducted when the likelihood of detecting bats is highest, when they will be most active in the vicinity of the potential roost. The time when bats are most likely to be detected near a roost is from 30 minutes prior to sunset until it is too dark to see.

A note about species identification: Given their nocturnal and cryptic habits, bat species can be difficult to identify, and most species found in Canada are similar in size and appearance. In addition, identification of species from acoustic surveys requires a great deal of care and potentially, expertise. Software packages with auto-ID functions are not considered suitable for this purpose. Unless a QEP with considerable bat expertise identifies them as otherwise, assume that all bats found are one of those listed as endangered in the SARA. In addition, presence of one species does not preclude the presence of another additional species.

5. INSPECTION PROTOCOLS FOR BUILT ASSETS

Inspections must be completed no greater than two weeks prior to commencement of work. Results of the inspection will determine next steps and must be documented and provided in the Scope of Work to the IAO.

The inspection process consists of numerous steps to determine whether or not bats are present in the built asset. The preliminary survey involves inspecting the internal and external physical elements of the built asset. The secondary survey is comprised of methods to detect the presence of bats if the preliminary survey did not provide enough information to confirm or rule out the presence of bats, if the presence of bats is suspected, but they are not directly seen during the preliminary survey, or if an estimation of colony size is necessary.

Preliminary Survey

1. External – conduct an external examination of the built asset, to identify any holes that could be used by bats to gain entry. This could include:
    i. Holes in the structure, even as small as 15mm X 6mmX 19mm
    ii. Missing screens, ill-fitting hatches and doors and windowsills
    iii. Openings around air conditioners, ducts, piping, and plumbing
    iv. Log shrinkage
    v. Chimneys, open out-buildings, open windows etc.
    vi. Any areas of wear in siding, eaves, windows, ledges, or any area of the structure where bats may seek shelter but be excluded from the interior.

2. Internal – inspecting the internal space of the structure involves gaining access to any of the spaces that bats may access, including: attics, crawl spaces, cellars, basements etc. If access points have been identified from the external inspection, determine where these access points would lead to inspect the internal space.

3. Use the data sheet in Appendix A to complete the external and internal inspections and record the following information:

    a. Direct evidence of presence of bats:
        i. Observations of bats flying in and out of the structure
        ii. Bat carcasses
        iii. Chittering sounds coming from the structure, particularly prior to emergence at dusk
        iv. Bats observed in the structure while roosting. It may be possible to observe the bats while they are roosting, using a flashlight or red light. Conducting roost surveys during summertime is not preferable, as it may significantly disturb the animals, and should be avoided if possible. Consider other methods, such as roost loggers, and emergence surveys. If an internal roost observation is necessary, minimize the impacts on bats by timing your observation to occur in the afternoon once bats have settled from early morning foraging activity. In addition, this kind of inspection should occur near the end of pregnancy to avoid disturbing neonates. Ideally, if observing a roost is necessary, a method to minimize disturbance would be utilized, such as using a fiber optic inspection camera to avoid having to physically enter the space.
    b. Indirect evidence for presence of bats:
        i. Bat droppings – guano typically accumulates in piles below roosts if they are well-used, but any sign of droppings is an indication of use. The quantity of guano will be recorded on the inspection data sheet and may help determine the likelihood of use by bats. Droppings are superficially similar to large rodent droppings, but on closer inspection differ from rodent droppings because they are comprised of insect exoskeletons and lack a vegetative component. Bat guano usually forms piles and crumbles to a fine powder when crushed, whereas rodent droppings are scattered and harden with age.
        ii. Insect remains – some bats capture and consume moths, butterflies, and other large insects. They discard the wings or wing covers which often accumulate below roosts, and may also be evident in the guano.

iii. Smell – well-used roosts may have a strong ammonia odour, particularly where ventilation is poor and humidity is high.
iv. Urine and pelage oils – shiny surfaces such as polished wood, plastic, or stone, may show stains from these substances. Look for these stains at potential entry points.

c. Ensure that the individuals performing the inspection are familiar with the MRGNP Guidelines for Encountering Individual Bats.
d. Using Table 1 below, determine the probability of bat presence. If the probability is low, and work on the structure can be completed within two weeks of inspection, no further inspection is required. If the probability is moderate or high, proceed to a secondary survey.

Table 1. Bat Presence in PCA Buildings - Preliminary Survey Outcomes (*from:* Draft HWC Bat Management Protocols, Banff Field Unit, prepared by Eric Knight, Greg Horne & Geoff Skinner)

Probability of Bat Presence	Criteria
Low	• No structural or historical indicators of bat presence • No bat sightings or sign
Moderate	• Historical sightings of bats or signs of bat guano within last 5-10yrs • Presence of cracks or holes of 5/8" or greater • Building is old or abandoned typically with low human use (unmaintained or being of older construction i.e. brick, stone or timber construction) • Roofing or building designs which facilitate roosting bats (attics, false ceilings, metal roof caps, "in-between" spaces) • Proximity to good bat foraging and roosting habitat
High	• Urine or pelage staining • Bat guano (fresh or old) • Bat sighting • Bat acoustics • Accumulated insect carapaces • Distinct bat smell

Secondary survey – to be conducted if the preliminary survey indicates a moderate or high probability of occurrence, or if the preliminary survey is inconclusive.

1) Acoustic monitoring of the suspected roost site may provide the most cost effective means to determine the presence or absence of bats. In addition, acoustic monitoring may provide information about the pattern of use, and approximate number of bats involved. Roost loggers are not well-suited to species identification if they are zero crossing detectors such as the AnaBat™ Express. Full – spectrum detectors, such as the Wildlife Acoustics Sm4 FS or Anabat Swift are more effective at species identification; however, automatic identification software is not adequate to definitively confirm species surveyed. Both of these detector types will, however, provide evidence of bat presence and auto-ID software will suggest the range of species likely present.

   i) *Duration of monitoring required*: Bats are not as active and therefore less likely to be detected during inclement weather. Also, they move between a series of roosts on successive nights.

Therefore, it is suggested to plan for an adequate number of evenings to monitor over to allow for poor weather and roost switching. Two weeks would be ample, but the time required will likely be less.

ii) *Timing of recording*: ½ hour before sunset to ½ hour after sunset

iii) *Placement of the detector*: the following directions are from the instruction manual provided with the AnaBat™ Express and the PCA acoustic monitoring protocols. If using a different detector, follow the guidelines for the detector that you are using, including instructions for battery life, firmware, updates, memory requirements, etc.

(a) To facilitate the highest chance of detection, mount the detector in the area you expect the bats will by flying through, close to the expected flight path.

(b) Avoid mounting the detector in a location where there will be vegetation or other objects directly behind it, or between it and the expected flight path of the bats.

(c) The closer it is to any kind of structure, a bat will echolocate more quietly, so try not to capture their calls *in* a very tight space or constriction. It will be more effective to detect as they exit or enter towards a constriction (best as they are entering).

(d) If using a directional microphone, elevate the detector/microphone as high as reasonably possible; it should be mounted at least 1.4m off the ground, and 3 to 5m from dense vegetation or other objects that could create disturbance in the recording. It is preferable to point the microphone in the direction that will capture bats as they return in to the structure, rather than to where they are going when they exit because they will echolocate more coming in to a constriction rather than going out of one. The most sensitive axis is straight out from the microphone

(e) If using an omnidirectional microphone, place it higher from the ground and further from clutter. A telescopic painter's pole or two connected pieces of 10-foot galvanized steel pipe (1.5" diameter) can be used for this. Non-metallic poles should be grounded so that static electricity does not short out the microphone, and metal poles may be unsuitable in areas prone to lighting. An omnidirectional microphone can record ultrasonic sounds from all directions, but is less sensitive to sounds directly behind the microphone.

(f) Avoid flowing water

(g) Avoid a location where anything could drop on or obstruct the microphone

2) Emergence Survey: an emergence survey can determine if bats are present at a potential roost site and causes minimal disturbance to the potential colony. Emergence surveys can also provide reliable estimates of volant (mobile, i.e. not pups who cannot yet fly). Refer to section 3.4 in the Parks Canada Bat Monitoring Protocol to determine if your situation meets these conditions. Emergence counts can also assist in Ecological Integrity and Species at Risk monitoring programs. Best practices for emergence surveys are as follows:

i) The survey will be more likely to detect the presence of bats if all exit and entrance points are known.

ii) There should be multiple observers, enough to observe the entirety of the structure, to cover all potential entry and exit points.

iii) Conduct survey from at least ½ hr before sunset, to 1 hour after sunset. For the first attempt, it may be prudent to begin more than ½ hour prior to sunset.
iv) Conduct in rain-free conditions, temperature above 10 degrees Celsius, and winds less than 16km/hr.
v)A void the use of bright lights, and use red lights to maintain night vision.
vi) Infra-red cameras may be used to assist with counting ("seeing") bats during emergence surveys. MRGNP currently has a thermal infrared camera that can be used with an iPhone or iPad to detect bats in the dark (FLIR One for IOS).
vii) A hand-held acoustic bat detector can also be used to detect bats during emergence surveys if number of bats is not as important as the presence or absence. MRGNP has an Echo Meter Touch handheld acoustic bat detector that can be connected to a phone or ipad to detect bats during an emergence survey.
viii) Conduct in conjunction with acoustic monitoring/roost loggers if possible
ix) Conduct over 2-3 consecutive nights, once certain you are beginning the survey at the right time, and feel confident you have all entrances/exits covered.

3) Seek local knowledge to support your inspections. Consult staff who have worked in the vicinity or local conservation experts, natural historians (etc.) to ask whether they have seen bats in the vicinity of the built asset.

NSPECTION P

6. 'ECTION PROTOCOLS FOR TREES

Eleven of the 16 species of bat found in BC use wildlife trees for roosting and hibernation. Trees are used as roosts during daytime, nighttime for foraging breaks, and for maternity roosting. Roost preferences depend on age, species, and stage of life but can occur in cavities, cracks in trunks, spaces under loose bark, and branches concealed by foliage (Fenger et al. 2006). Most tree-roosting bats outside of hibernacula and maternity roosts switch roosts regularly, moving distances of a few meters to several kilometers (Fenger et al. 2006). For this reason, it is prudent to conduct inspections over several evenings. Below are a series of guidelines about where to look for roosts, species identification, and decision rules for preliminary and secondary roost surveys for trees.

Roost survey guidelines:

The preliminary roost survey consists of assessing the habitat potential of the area, identifying possible roost trees, and assessing the roosting probability of those trees (see Table 2). For trees identified as having medium or high potential a secondary survey is conducted to determine whether or not bats are actually roosting in those trees.

Preliminary Survey

1. All trees proposed for removal must be examined, as well as those within radius of 1.5X the height of the tree.
2. Binoculars, and DBH tape are essential.
3. Bat roost surveys can be conducted in conjunction with nest surveys for migratory birds.

4. Conduct a systematic walk-through of the area identified, to identify and prioritize trees for roost monitoring. Habitats suitable to contain roosts will often be in areas that provide shelter and foraging habitat. Bats are nocturnal insectivores and prey on insects and spiders while flying, from the air, and from the surfaces of leaves and other vegetation. Suitable habitats that may include or be near roosts are rock outcroppings, water bodies, wetlands, forest gaps, edges, trails and corridors, and mature, uncluttered forest.
5. Identify roost trees to be surveyed, looking for the following characteristics:
    a. Trees with DBH>25cm
    b. Trees that protrude above the canopy, in openings, edges, and forest clearings
    c. Trees in early-mid decay
    d. Cracks, decay cavities, and crevices in trees
    e. Woodpecker holes
    f. Deadwood in the canopy or stem
    g. Fractured limbs, hazard beam cracks
    h. Large sections of loose or flaking bark
    i. A hollow trunk, stem, or branches
    j. Overhanging root wads
6. Inspect each tree for signs of use by bats. Look for all the same direct and indirect indications of use as are listed above under the preliminary survey description for built assets.

Assess the potential for roosting using Table 2. Determinations that trees have low roosting potential must be made with high certainty. If trees are determined to have negligible or low roosting potential, harvesting may be conducted according to the Best Management Practice for Vegetation Removal 01.03 for MRGNP.

Table 2. Bat Roosting Potential for Trees (*from*: Draft Pre-construction Bat Roost Survey Guidelines for Projects Requiring Tree Removal from April to September, Banff Field Unit, prepared by Helen Dickenson)

Potential	Criteria
Negligible	Trees < 25 cm DBH
Low	Trees > 25 cm DBH with the following characteristics: • No cracks or crevices. • No deadwood in canopy or stem • No decay cavities or hollow stem • No bat sightings or sign
Medium	Trees > 25 cm DBH with the following characteristics: • Some small cracks or crevices • Deadwood in canopy or stem
High	Trees > 25 cm DBH with the following characteristics: • Woodpecker holes • Fractured limbs and/or hazard beam cracks • Large sections of loose or flaking bark • Cavities, cracks, crevices • A hollow trunk, stem or branches

Secondary survey

1. Roost surveys to detect bats should occur within 5 days of harvesting of trees to decrease the likelihood of bats adopting a tree after the survey is completed. Surveys will take one to several days to complete depending on results and weather.
2. Acoustic surveys can be conducted in an area as a means of narrowing down the possible options.
    a. Follow the instructions for acoustic surveys using passive detectors as described above for secondary surveys in built assets.
    b. Given that locations will be less predictable than for buildings follow the guidelines for acoustic detector placement in built assets (a-g) for placement of the detector, as well as the following:
        i. Dense vegetation can cause bats to modify their echolocation and poor quality recordings
        ii. Bats often avoid wide open spaces, such as the middle of open fields, and areas with a high degree of background noise such as fast moving water
        iii. Echolocation calls will bounce off of hard and flat surfaces, such as roofs, walls, pavement, smooth rock faces, and standing water so avoid placing detectors over or near surfaces such as these.
    c. If no bats are detected on 2-3 evenings of surveys, it can be inferred that the trees are not active roosts.
    d. If bats are detected further assessment should be completed on the following evening(s). See #4.
3. Emergence surveys should be carried out for each tree identified as having medium or high roosting potential, and/or for trees that acoustic monitoring suggest may be a roost.
4. Follow the protocols for emergence surveys (above, under built assets, secondary survey) for trees. If possible, utilize the Echometer Touch bat detector and/or FLIR infrared camera to complete the emergence surveys.
5. If bats are detected during the emergence and passive acoustic surveys but surveyors are unable to pinpoint the tree, a further night or two of emergence surveys should be conducted.

7. DATA RECORDING AND REPORTING:

Collect all data indicated on the data sheets included in Appendix A.

All records and information should be submitted to the IAO for review throughout the survey period. Decisions to proceed to the next survey stage will be made with consultation between the QEP and the IAO. The decision of whether to proceed with tree removal following completion of inspections will rest with the IAO **Tree removal after inspection must adhere to the best practices outlined in Appendix D of the BMP for Vegetation Removal 01.03.**

Any acoustic recordings will be analysed by both an automatic identification software program and the QEP or external expert in bat call identification. Where resources or data do not permit delineation of bats to species, it will be assumed that any bats detected are those listed as endangered under SARA.

8. ACRONYMS AND DEFINITIONS:

BC: British Columbia

BMP: Best management practices

IA: Impact Assessment

IAO: Impact assessment officer

MRGNP: Mount Revelstoke and Glacier national parks

PCA: Parks Canada Agency

QEP: Qualified environmental professional

The government of the province of British Columbia defines a QEP as follows:

"A qualified environmental professional (QEP) is an applied scientist or technologist who is registered and in good standing with an appropriate B.C. professional organization constituted under an Act. The QEP must be acting under that association's code of ethics, and subject to the organization's disciplinary action.

A qualified environmental professional could be a professional Biologist, Agrologist, Forester, Geoscientist, Engineer, or Technologist.

Qualified environmental professionals can conduct assessments as individuals or together with other qualified environmental professionals. They must have an area of expertise that is recognized in the assessment methods as one that is acceptable for the purpose of providing all or part of an assessment report for the particular development proposal that is being assessed. They will only be considered a qualified environmental professional for that portion of the assessment that is within their area of expertise, as identified in the assessment methodology."

For the purposes of this document, a QEP is a person with the qualifications defined above, and with bat-related knowledge and training. This may be an external contractor or a Parks Canada employee

SARA: Species at Risk Act

9. REFERENCES USED TO PREPARE THIS DOCUMENT

Craig, J., and M. Sarell. 2017. Got Bats? A BC guide for Managing Bats in Buildings. Community Bat Programs of BC.

Dickenson, H. 2016. Pre-construction Bat Roost Survey Guidelines for Projects Requiring Tree Removal from April to September (Draft). Banff Field Unit, Parks Canada.

Environment and Climate Change Canada. 2018. Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis septentrionalis*), and the Tri-colored Bat (*Perimyotis subflavus*) in

Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 172 pp.

Fundy National Park Guidance for Inspecting Built Assets for Bats

Holroyd, S.L., V.J. Craig, and P. Govindarajulu. 2016. Best Management Practices for Bats in British Columbia, Chapter 1: Introduction to the Bats of British Columbia. B.C. Ministry of Environment, Victoria, BC. 108 pp.

Kellner, M. 2016. Glacier National Park Bat Roost Survey Protocol for use in late April/early May – Draft

Kellner, M. 2017. Bat Presence/Not Detected Surveys in Mount Revelstoke and Glacier National Parks, BC. Final Report: 2015 – 2016.

Knight, E., G. Horne. And G. Skinner. 2018. Draft HWC Bat Management Protocols. Banff Field Unit, Parks Canada

Loeb, S.C., T.J. Rodhouse, L.E. Ellison, C.L. Lausen, J.D. Reichard, K.M. Irvine, T.E. Ingersoll, J.T.H. Coleman, W.E. Thogmartin, J.R. Sauer, C.M. Francis, M.L. Bayless, T.R. Stanley, and D.H. Johnson. 2015. A plan for the North American Bat Monitoring Program (NABat). U.S. Forest Service General Technical Report.

Whitaker, D., J. Bridgeland, and G. Horne. 2015. Bat Monitoring Protocols (Draft). Parks Canada.

Wildlife Conservation Society. 2017. Mount Revelstoke and Glacier national Parks 2017 Bat Acoustic Recordings: NABat and Nakimu Cave Acoustic Monitoring Results Summary.

APPENDIX A: Data Sheets

Preliminary Built Assets Survey for Bats		
Surveyor(s):		**IEM#:**
Park:	**UTM:**	
Location:		
Date:	**Time (24hrs):**	**Temperature:**
Weather:		
Building Type/Description:		
Planned Work:		

Survey type:

☐ Visual of Exterior ☐ Visual of Interior ☐Inspection Camera

☐Visual of Attic Space/Chimneys/Cavities

Bat Indicators

Structural		Bat Sign		Historical Sign	
Old or Abandoned	☐	Guano - Fresh	☐	Sightings	☐
False Ceiling or Attic	☐	Guano - Old	☐	Odour	☐
Shutters/Vents	☐	Guano Accumulation	1-5☐	Noise	☐
Loose Siding	☐		5-20☐	Consultation Notes:	
Metal Roof Caps	☐		20-50☐		
Chimney	☐		50+☐		
Access Points:		Urine Staining	☐		
Cracks w Staining	☐	Visual (alive or dead)	☐		
Cracks w/o Staining	☐	Acoustics	☐		
Holes w Staining	☐	Insect Carapaces and wings	☐		
Holes w/o Staining	☐				
Holes w Scratch Marks	☐				
Other_____	☐				

Bat Presence Probability Rating (refer to Table 1. From inspection guidelines, included below):

High Probability - Bat Sign Confirmed ☐

High Probability - Structural and Historical Indicators ☐

Medium Probability - Structural Indicators Alone ☐

Medium Probability - Historical Indicators Alone ☐

Low Probability - No Structural, Historical or Bat Sign Found ☐

Locations resulting in a bat probability rating of medium or high require secondary survey to confirm bat use, determine species and determine type of bat use

Photo Documentation		
Photo Number	**Direction**	**Description**

Diagram/Map:

Comments:

Secondary Built Assets Survey for Bats		
Surveyor(s):		**IEM#:**
Park:	**UTM:**	
Location:		
Date:	**Time (24hrs):**	**Temperature:**
Weather:		
Building Type/Description:		
Planned Work:		
Sunset time:	**Sunrise Time:**	
Survey Type:		
☐Roost Logger ☐Passive Acoustic Monitor	☐ Emergence Survey	☐ Other _____

Roost Logger/Acoustic Monitor				
Logger Make/Name/Serial#	**Location**	**Date Start**	**Date Finish**	**Recording Schedule**

Emergence Details		
Location	**Time**	**# of Bats Observed**

Summary of Survey Results:
Comments:

Preliminary Tree Survey for Bats		
Surveyor(s):		**Date:**
Park:		**UTM:**
Location:		
Tree Species:	**Tree DBH:**	**Tree height:**
Weather:		
Habitat description:		
Planned Work:		

Survey type:

☐ Site survey/walk-around ☐ Visual of Tree Exterior ☐Inspection Camera
☐Other

Bat Indicators

Tree characteristics		Bat Sign		Historical Sign	
Cracks or crevices	☐	Guano - Fresh	☐	Sightings	☐
Cavities	☐	Guano - Old	☐	Odour	☐
Deadwood in canopy/stem	☐	Guano Accumulation	1-5☐	Noise	☐
Fractured limbs	☐		5-20☐	Consultation Notes:	
Hazard beam cracks	☐		20-50☐		
Loose or flaking bark	☐		50+☐		
Woodpecker holes	☐	Urine Staining	☐		
Hollow trunk or branches	☐	Visual (alive or dead)	☐		
Overhanging root wads	☐	Noise (clicks, squeaks)	☐		
DBH > 25 cm	☐	Insect Carapaces and wings	☐		
Other_____	☐	Odour	☐		
Other_____	☐	Other:			
Stage of decay:					

Bat Presence Probability Rating (refer to Table 2. in Inspection Guidelines included below)

High Probability - Bat sign or activity confirmed ☐
High Probability – Trees > 25 cm with holes, loose bark, hollow trunk, cavities etc. ☐
Medium Probability – Trees > 25cm DBH with some cracks or deadwood ☐
Low Probability – Trees > 25 cm DBH but no cracks, decay, or deadwood ☐
Negligible Probability – No trees greater than 25cm DBH ☐

Locations resulting in a bat probability rating of medium or high require secondary survey to confirm bat use, determine species and determine type of bat use

Photo Documentation		
Photo Number and File Location	**Direction**	**Description**
Diagram/Map:		
Comments:		

Secondary Tree Survey for Bats			
Surveyor(s):		**Park:**	
Location:		**Date range:**	
Cloud cover (%):	**Temp (C):**	**Wind (km/hr):**	**Precip:**
UTM (tree or passive sampling area):			
Planned Work:			
Sunset time:	**Sunrise time:**		

Survey Type:

☐Roost Logger ☐ Passive Acoustic ☐ Other _____

☐ Emergence Survey Visual ☐ Emergence survey w/ Echometer ☐ Emergence survey w/ FLIR

Emergence survey details

Location/UTM	Method	Time Start	Time End	# of Bats Observed	Notes

Acoustic Monitoring

Detector Make/Name/Serial#	Location or UTM	Time start	Time End	Notes

Summary of survey results				

APPENDIX B. Resources providing background information about roosting habitat use by bats in BC.

The following three tables are reproduced from section 4 of:

Holroyd, S.L., V.J. Craig, and P. Govindarajulu. 2016. Best Management Practices for Bats in British Columbia, Chapter 1: Introduction to the Bats of British Columbia. B.C. Ministry of Environment, Victoria, BC. 108 pp.

Table 3. Bat roost types and their definitions.

Roost Type	**Definition**
Ephemeral roost	A bat roost in a feature where the characteristics important to bats (e.g., microclimate) may change quickly and/or unpredictably; for example, an area under sloughing tree bark.
Permanent roost	A roost that is available for bat use over many years and has suitable characteristics (e.g., microclimate, access) that remain stable over time. Examples of permanent roosts include caves, cliffs, mines, bridges, buildings, and large hollow trees of a slow-decaying species, such as western redcedar (*Thuja plicata*).
Night-roost	A roost where bats rest at night between foraging bouts. Bats may roost singly or congregate.
Day-roost	A roost where bats rest during the day in spring/summer/autumn. Day-roost types include maternity roosts, bachelor roosts, and mixed male/non-reproductive female/yearling groups. Use of a specific day-roost may be seasonal or variable within a season.
Maternity roost	A roost used outside the winter period by adult females that are capable of reproduction.
Nursery roost	A roost where females congregate to give birth and raise their young (adapted from Knight and Jones 2009). A nursery roost is a type of maternity roost.
Bachelor roost	A roost used by one or more males during the day.
Fall migratory rest stop	A roost used by bats during migration between summer and winter habitats.
Winter hibernation roost	A site where one or more bats hibernate in winter (hibernacula [plural]). A given hibernaculum may be used by bats for only part of the winter, and may not be used every winter.

Table 4. Known roosting preferences of British Columbia bats in summer and winter (some information is from research conducted outside the province).

Species	Summer Roosts[a,b]							Winter Roosts[a]
	Trees	Rock crevices, outcrops	Cliffs	Mines	Buildings	Bridges	Bat houses	
Little Brown Myotis	D	Y	Y	Y	Y	Y	Y	Mines, caves
Yuma Myotis	D	Y	N	Y	Y	Y	Y	Mines, buildings
Long-legged Myotis	D, Stump	Y	Y	N	S	N	N	Mines, caves
Western Small- footed	N	Y	Y	Y	S	N	N	Mines, cliff
Californian Myotis	D	Y	N	Y	S	Y	Y	Buildings, mines, caves
Fringed Myotis	D	Y	N	Y	S	N	N	Mines
Long-eared Myotis	D, Stump	Y	Y	N	S	N	Y	Mines, buildings
Keen's Myotis	D	Y	N	Y		N		Dead/dying trees, rock crevices
Northern Myotis	D	N	N	N	R	N		Mines
Townsend's Big-eared	Y (big)[c]	N	Y	Y	Y	P	Y (big)[c]	Mines, caves
Eastern Red Bat	L	N	N	N	N	N	N	Migrates
Hoary Bat	D, L	N	N	N	N	P	N	Migrates
Silver-haired Bat	T, L	N	N	N	N	N	N	Dead/dying/live trees, mines, buildings; migrates
Big Brown Bat	D	Y	Y	N	Y	Y	Y	Buildings, mines, rock
Pallid Bat	D	N	Y	Y	P	N	N	Rock crevices
Spotted Bat	N	N	Y	N	N	N	N	Cliffs, mines

[a] Sources: Nagorsen and Brigham 1993; Sarell and Luoma 1994; Rasheed and Holroyd 1995; Vonhof and Barclay 1996, 1997; Rabe et al. 1998; Barclay and Brigham 2001; Holloway and Barclay 2001; Fenton et al. 2002; Rambaldini 2003; Lausen and Hill 2016

[b] D = dead/dying; L = live; T = in furrows on the surface of tree bark; Y = Yes, N = No, S = Sometimes, R = Rarely, P = Potential (known to do so elsewhere, not known for British Columbia)

[c] “big” tree roosts include very large hollow trees (e.g., Western redcedar); “big” bat houses are akin to small sheds or buildings

t specifically for this species.

Table 5. Examples of tree species used for roosting by bats in British Columbia (B.C.). References include studies conducted outside of British Columbia but within the species' North American distribution range.

Species	Location	Roost	Reference
Little Brown Myotis or Yuma Myotis	Coastal B.C.	Large western redcedar (*Thuja plicata*)	van den Driessche et al. 2000
Little Brown Myotis	Central B.C.	Western hemlock (*Tsuga heterophylla*) – crack western redcedar – snags and stump	Rasheed and Holroyd 1995
Little Brown Myotis	Central Alberta	Trembling aspen (*Populus tremuloides*) snags	Crampton and Barclay 1996
Little Brown Myotis	Saskatchewan	Trembling aspen (declining live trees and snags)	Kalcounis and Hecker 1996
Yuma Myotis	Kootenays, B.C.	Tree stump	Vonhof and Barclay 1997
Californian Myotis	Southern Interior B.C.	Most notably Douglas-fir (*Pseudotsuga menziesii*) snags, but also grand fir (*Abies grandis*) and western white pine (*Pinus monticola*) snags	Brigham et al. 1997b
Long-legged Myotis	Central B.C.	Douglas-fir – crack from lightning strike	Rasheed and Holroyd 1995
Long-legged Myotis	Oregon	Primarily Douglas-fir snags, but also western hemlock and western redcedar snags (fire- hollowed), and some live Douglas-fir trees	Ormsbee 1996
Long-legged Myotis	Oregon	Large Douglas-fir snags	Ormsbee and McComb 1998
Long-eared Myotis	Kootenays B.C.	Tree stumps – ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*) preferred, but also used western redcedar, Douglas-fir, grand fir, western hemlock, and Western white pine	Vonhof and Barclay 1997
Long-eared Myotis	Oregon	Primarily Douglas-fir snags, but also used western hemlock and Douglas-fir stumps	Waldien et al. 2000
Northern Myotis	Northeastern B.C.	Trembling aspen and balsam poplar (*Populus balsamifera*)	Vonhof and Wilkinson 1999, 2000
Fringed Myotis	Northern California	Douglas-fir snags	Weller and Zabel 2001
Big Brown Bat	Kootenays B.C.	Ponderosa pine	Brigham et al. 1997b
Big Brown Bat	Southern B.C.	Douglas-fir snags	Rasheed and Holroyd 1995

Big Brown Bat	Southern B.C.	Trembling aspen snags	Vonhof 1996a
Big Brown Bat	Southern B.C.	Trembling aspen cavities	Rasheed and Holroyd 1995
Big Brown Bat	B.C.	Ponderosa pine snags	Brigham 1991
Big Brown Bat	Saskatchewan	Trembling aspen cavities	Kalcounis and Brigham 1998
Big Brown Bat	Saskatchewan	Trembling aspen cavities	Willis et al. 2003
Big Brown Bat	Oregon	Ponderosa pine	Betts 1996
Silver-haired Bat	Coastal B.C.	Large western redcedar	van den Driessche et al. 2000
Silver-haired Bat	Kootenays B.C.	Ponderosa pine	Brigham et al.
Silver-haired Bat	Southern B.C.	Live trembling aspen (cavities)	Rasheed and Holroyd 1995
Silver-haired Bat	Southern B.C.	Trembling aspen snags preferred, but also uses Douglas-fir	Vonhof 1996a
Silver-haired Bat	Central Alberta	Trembling aspen snags	Crampton and Barclay 1996
Silver-haired Bat	Manitoba	Peach-leaved willow (Salix amygdaloides) and green ash (Fraxinus pennsylvanica)	Barclay et al. 1988
Silver-haired Bat	Oregon	Grand fir, ponderosa pine, western larch (Larix occidentalis)	Betts 1996
Hoary Bat	Saskatchewan	White spruce (Picea glauca)	Willis and Brigham 2005
Hoary Bat	Manitoba	Peach-leaved willow (Salix amygdaloides) and green ash (Fraxinus pennsylvanica)	Koehler 1991
Hoary Bat	Ontario	Mature white and red pine (Pinus strobes, P. resinosa) located close to flyway edges (roads, river channels); also used trees heavy with grapevine (Vitus spp.) overgrowth	B. Hickey, pers. comm.

APPENDIX IX

PARKS CANADA NATIONAL BEST MANAGEMENT PRACTICES – MIGRATORY BIRDS

DRAFT-Parks Canada National Best Management Practices

Migratory Birds

Last updated: April 12, 2017

Parks Canada Parcs Canada

Canada

Approved by

Original signed by Nadine Crookes

_____

Nadine Crookes, Director Natural Resource Conservation Branch

Original signed by Kalvin Mercer

_____

Kalvin Mercer, Associate Vice-President, Asset Management and Project Delivery Approval

_____

Date

Table of Contents

List of Definitions

Buffer Zone: means a designated protective and avoidance area around a migratory bird nest that minimizes disturbance to nesting birds and their offspring from construction and work site activities. Buffer zones are determined by recommended setback distances and take into consideration the species, the intensity of disturbance and the surrounding habitat.

Built Asset: includes contemporary and cultural heritage buildings, fortifications and infrastructure. Infrastructure includes highways, roads, bridges, marine structures, utilities and grounds (Parks Canada Project Management Standard, 2016). Some Parks Canada built assets are used by migratory birds as nesting habitat (e.g., buildings [ledges, eaves, gutters], bridges, canals, tunnels, picnic shelters, outdoor washrooms, kiosks, utility poles).

Construction Limit: an area with established boundaries where construction and project activities (including staging/laydown areas) are permitted.

Critical Habitat: means the habitat that is identified as necessary for the survival and/or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species and as posted on the Species at Risk Public Registry (*Species at Risk Act*, S.C. 2002, c.29).

Designated Parks Canada Contact: refers to the person within the field unit with the expertise, authority and mandate to make decisions on migratory birds. The Designated Parks Canada Contact is identified at the field unit level and is not necessarily always the IAO.

Incidental Take: inadvertent harming, killing, disturbance or destruction of migratory birds, nests and or eggs.

Listed Species: species appearing on the List of Wildlife Species at Risk set out in Schedule 1 of the *Species at Risk Act* (S.C. 2002, c.29).

Migratory Bird: means a migratory species of bird referred to in the *Migratory Birds Convention Act*, 1994, and includes the sperm, eggs, embryos, tissue cultures and parts of the bird. The list of migratory bird species can be found here.

Nest: means the nest of a migratory bird and includes parts of the nest (*Migratory Birds Convention Act*, 1994). From the Merriam-Webster Dictionary, a nest is 'a bed or receptacle prepared by an animal and especially a bird for its eggs and young.' Note that nests of species not included under the *Migratory Birds Convention Act* may still be protected by the *Canada National Parks Act* or the *Species at Risk Act* and could be considered nests for the purposes of this BMP.

Qualified Environmental Professional: someone who is familiar with the ecoregion and has knowledge of the nesting and other life history behaviours of bird species potentially found at that location, including species at risk and secretive species.

Residence: means a dwelling-place, such as a den, nest or other similar area or place that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating (*Species at Risk Act*, S.C. 2002, c.29).

Setback Distance: means the distance at which nesting birds react to human disturbance. The setback distance is determined based on the species, the level of the disturbance and the landscape context.

List of Acronyms

BMP: Best Management Practice
CEAA 2012: *Canadian Environmental Assessment Act, 2012*

COSEWIC: Committee on the Status of Endangered Wildlife in Canada
ECCC: Environment and Climate Change Canada
ESO: Environmental Surveillance Officer
EIA: Environmental Impact Assessment
IA: Impact Assessment
IAO: Impact Assessment Officer
MBCA: *Migratory Birds Convention Act, 1994*
SARA: *Species at Risk Act*
SCM: Species Conservation and Management

Scope of Application

This Best Management Practice (BMP) is intended to be used as a last resort when project planning cannot avoid the migratory bird nesting period for the area, and work must be conducted within that period. It is part of a guidance package to help Parks Canada staff comply with the *Migratory Birds Convention Act, 1994* (*MBCA*), which includes guidance on defining regional nesting periods, assessing risk to migratory birds, and conducting breeding activity surveys. Specifically, this BMP supports Step 3 of the process map within the *DRAFT Parks Canada Guidance on Managing Migratory Birds*. **It should be used when project activities occur within and on the fringes[1] of the migratory bird nesting period, which may start as early as mid-March and extend until late August, with regional variation across Canada.**

Depending on the species, migratory bird nests may be found in various types of vegetation (e.g., trees, tree cavities, shrubs, forbs, cattails), on the ground, in burrows, on stockpiles of overburden and exposed soil banks in quarries or pits, on cliffs and on or in built assets. This BMP covers general mitigations that apply to any area supporting nesting migratory birds as well as additional information for projects affecting the following specific nesting habitats: Built Assets, Forest, Wetland, Agriculture, and Maintained Landscapes.

Examples of activities included in this BMP are:

- maintenance and modification of built assets (e.g., repairs to building envelope, bridge work, utility line repair, and building expansions)
- vegetation management (e.g. clearing and grubbing for construction, Firesmart tree removal for protection of infrastructure from wildfire, routine roadside vegetation management, brush cutting, lawn mowing, hay cutting, disposal of vegetation debris, hazard/danger tree removal)
- agriculture operations (e.g., livestock management, hay cutting)
- demolition of built assets

NOTE: Should breeding activity (i.e., nests, behavioural cues) be discovered before or after the project has started, project managers must expect project delays if the risk of incidental take cannot be mitigated.

Exceptions

This BMP is not suitable for the following project activities as they would likely require additional analysis via another impact assessment pathway or there are additional legislative or permitting issues to consider. **NOTE**: this BMP is not suitable for the following situations regardless of whether project activities occur inside or outside of the migratory bird nesting period.

- activities that threaten the continued persistence of a migratory bird species population, either directly or through alteration of habitat
- any activity which would involve removal or destruction of a migratory bird nest
- activities with residual adverse effects on an individual or a residence of a listed species at risk (endangered, threatened, or extirpated status)
- activities with potential adverse effects on the critical habitat of a listed species at risk
- activities impacting designated habitat for migratory birds (e.g., Important Bird Areas, Ramsar sites)

[1] Nest building activities can take place a few days up to around 2 weeks prior to Environment and Climate Change Canada's estimated regional nesting periods and some birds may build nests and lay eggs towards the end of the nesting window if the previous nest(s) were unsuccessful.

Consult the Species Conservation and Management Team and the Impact Assessment Team to address any uncertainty regarding potential adverse effects to migratory birds, their nests and eggs.
Note: All other natural resource and cultural resource impacts must be addressed in combination with other BMPs or through another impact assessment pathway. Some or all of the mitigation measures in this BMP may be used to prepare a Basic Impact Analysis or a Detailed Impact Analysis.

Approved geographic area of application

This BMP is intended for use in all Parks Canada administered protected heritage places.

Components of the environment that may be affected

- Harming, killing, disturbance or destruction of migratory birds, their nests, and eggs.

Mitigation Measures

The Impact Assessment Officer (IAO) must review this document to determine which mitigations apply to the project and which EIA pathway to use. *This BMP should be used to develop a mitigation strategy specific to the project, species and habitat; the BMP should never be handed over to the proponent as is without addressing project-specific circumstances.*

To use this document efficiently, and reduce the overall size and scope of the mitigations to present to contractors and project managers, follow these steps:

Step 1) Go to the Microsoft Word toolbar and select the View tab, then check the Navigation Pane box. This allows you to see all the headings and will allow for efficient editing. For example, if a whole section does not apply, simply right click on it in the Navigation Pane and choose delete.

Step 2) Add any supplementary mitigation measures to Section 6. Supplementary Mitigations.

Step 3) Save the document as a pdf or print a paper copy and include with the Environmental Impact Assessment (EIA) determination record.

General

Pre-Construction Phase:

1. During the nesting period, a breeding activity survey must be conducted a maximum of 7 days[2] prior to work commencing. Surveys must be completed by a qualified environmental professional. Results must be documented and provided to the designated Parks Canada contact prior to work commencing.
2. Should breeding activity or a nest be identified during the survey, the area will be left undisturbed with a suitable buffer zone established and maintained until the young have permanently left the vicinity of the nest. The size of the buffer will be species dependent and determined by the appropriate Parks Canada staff in consultation with regulatory guidance (Appendix 1). Consideration must be given to the context of the nest site, to allow the fledglings an 'exit' path, which may extend beyond the buffer zone.
    - If there is any uncertainty in determining the buffer zone, contact regional Environment and Climate Change Canada (ECCC) staff.
    - The limits of the buffer zone must be flagged to clearly identify the area especially in the direction of approaching construction activities; never mark individual nests using flagging tape or other similar material as this increases the risk of nest predation.

[2] This time period was selected based on balancing the risk of nest building in between survey checks, allowing time to implement mitigations, and accessing the site for work.

3. The designated Parks Canada contact must review the mitigation measures and any special requirements with all on-site personnel before work begins.

During-Construction Phase:

4. If breeding activity is identified during the construction phase, work must stop immediately, the designated Parks Canada contact notified and an appropriate buffer zone established.
5. The Prime Contractor or person with primary responsibility for the site, is responsible to ensure all personnel, including any sub-contractors are aware of the buffer zone, conduct activities as directed to minimise disturbance, and remain outside of its boundaries.
6. The Environmental Surveillance Officer (ESO) will monitor the area during construction to ensure the established buffer zone is effective.
7. If there is evidence that a buffer zone is ineffective (e.g., continued agitation/guarding behaviour, frequently leaving the nest) work must stop immediately and the buffer zone adjusted by the appropriate Parks Canada staff.
8. Any likely or confirmed incidental take[3] must be reported immediately to the ESO and mitigations adjusted as necessary.
9. The buffer zone can only be removed upon confirmation from the ESO and/or a qualified environmental professional that young have left the nest.
10. To prevent disturbance to potential nesting habitat within and adjacent to the project site:
    - Clearly delineate and enforce construction limits (e.g., snow fence, flagging tape) taking species and habitat into account.
    - Stay within the construction limit, including staging areas.
    - Use existing disturbed areas and right-of-ways whenever possible.
    - Keep people, equipment and vehicle traffic to a minimum.
11. Minimise construction noise above ambient levels by installing temporary structural noise barriers such as sand bags, baffle boxes, or sound walls.
12. Limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat. If construction timing restrictions are not possible:
    - Use down shielding or directional lighting to avoid light trespass into bird habitat.
    - To the extent practicable, use low intensity energy saving lighting and consider the use of motion or heat sensors to minimize illumination.
    - Avoid the use of bright white light, such as metal halide, halogen, fluorescent, mercury vapour and incandescent lamps.
13. If deterrent use is planned, appropriate species-specific deterrent systems[4] must be installed prior to the arrival of birds in the spring in order to prevent birds from nesting on/in the structure or in a particular area (e.g., stockpiles when bank nesting species are present). Deterrents must be removed once work is completed unless they are required to prevent nesting during the operational phase (e.g., chimney, vent). A variety of deterrents will likely be required to improve chances of success. These may include:
    - Visual deterrents: windsocks, flags, mobile owl decoys, mylar or aluminum foil strips. Frequently moving visual deterrents around the site may improve chances of success.
    - Physical deterrents: bird spikes, bird netting, tarps, chicken wire, hardware cloth (mesh), steel or copper wool. The netting or other deterrent method must have no opening or mesh size greater than 19 mm and must be maintained until the end of the nesting season.
14. Establish a species-specific monitoring program to determine whether barriers (e.g., netting, chicken wire, mesh) are effective and whether birds and other wildlife have become entangled. If birds break the barrier and start nesting, construction must be put on hold until the young have fledged.
15. No traps, chemical products, or electrified shock deterrents of any kind are to be used to exclude or deter birds from an area. Deterrents which are harmful to other wildlife species must not be used (e.g., ultrasonic noise deterrents where bats may be present). Electric fences and pads intended to deter large mammals such as bears should be installed such that birds are not harmed.
16. Install anti-perch devices on facilities/equipment that may cause a hazard to birds.

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[3] harming, killing, disturbance or destruction of migratory birds, nests and eggs

[4] Refer to the following for information on deterrents: https://www.gsa.gov/portal/content/113310

17. For sites requiring restoration, avoid planting "desirable" fruited or preferred nesting vegetation in locations that may result in harm to birds (e.g., medians, rights-of-way).
18. Avoid chemical contamination of nesting habitat (e.g., manage hazardous waste appropriately, refuel vehicles on impermeable disturbed surfaces, maintain spill kits on site at all times).
19. Minimise fire potential from project activities (e.g., use spark arrestors on power equipment).
20. Ensure that erosion control measures do not disturb migratory birds nesting on stockpiles of overburden or on exposed soil banks in sand pits or quarries.

Built Assets

General:

21. Apply General mitigations #1-20.
22. As a general starting point, ECCC suggests setback distances of 10-25m up to 50m or more for swallow colonies (further guidance in Appendix 1); other or much larger setbacks may be required for other species, sensitive species, or species at risk.
23. Prior to the nesting period, confirm absence of birds and block any entry points (e.g., cap pipes and cover/seal all small dark spaces where birds may enter and become trapped).
24. Once deterrents are in place, monitor the area at least once every three days for any evidence of nesting activity. If nest(s) are established, stop work immediately and contact the designated Parks Canada staff to implement the appropriate buffer zone.

Nest Removal:

25. Removal of nests is not a recommended mitigation measure within or outside the nesting season; contact the Impact Assessment team for advice.

Alternative Nesting Habitat:

26. When feasible, consider providing alternative nesting habitat (e.g., swallow nest boxes, nest platforms) nearby to increase success of deterrents; installation must take place prior to the nesting period.
27. If a built asset is demolished or altered such that birds cannot use it for nesting the following season, alternative habitat should be considered (e.g., nesting boxes for swallows) based on ecological/species requirements. The habitat should be constructed within 1km of the affected habitat and/or within 200m of an area that is accessible and suitable for foraging[5]. Note: A careful analysis of ecological and species requirements is required. The intent of alternative nesting habitat is not to generally promote nest box or other similar programs, but as a tool to mitigate for adverse effects in particular site-specific situations.

Forest

28. Apply General mitigations #1-20.
29. As a general starting point, ECCC suggests setback distances of 1-5m up to 10-50m or more for most nests of songbirds and other small birds; much larger setbacks may be required for sensitive species or species at risk (further guidance in Appendix 1).
30. To the extent possible, leave brush piles, dead logs and fallen woody material on the forest floor during the nesting period as it provides important habitat for birds.
31. To the extent possible, leave snags and cavity trees in place during forest clearing activities as they provide nesting habitat.

Wetlands

32. Apply General mitigations #1-20.
33. As a general starting point, ECCC suggests setback distances of 10-30m and up 50m or more for most waterfowl nests; much larger setbacks may be required for other wetland nesting species, sensitive species or species at risk (further guidance in Appendix 1).

[5] https://www.ontario.ca/page/alter-structure-habitat-barn-swallow

34. In late summer, wetlands will not be drained or cleared until broods are able to fly.

Agriculture

This section relates primarily to activities affecting ground nesting grasslands birds such as Bobolink and Eastern Meadowlark, however, it is recognised that other species (e.g., waterfowl, shorebirds) also utilise this habitat. The typical nesting cycle for grassland birds is about 42 days, with up to 7 to 10 days of additional time necessary for young to fly well enough to evade harvest machinery/livestock disturbance.

General:

35. Apply General mitigations #1-20.
36. Minimise pesticide use, apply the *Parks Canada Integrated Pest Management Directive*[6], and implement the Integrated Pest Management Plan accordingly.
37. The Manitoba Conservation Data Center indicates that setback distance for sensitive grassland species can range from 100-400m depending on the level of activity[7]. As a general starting point, ECCC suggests a minimum 50m setback from grassland songbird nests[8]. Setback must be determined based on project, species and habitat specific circumstances (further guidance in Appendix 1).

Hayfields:

38. Mow high-quality hayfields prior to the regional nesting period to discourage birds from nesting or delay hay cutting until after young have fledged. In the case of the latter, monitor the field closely and conduct breeding activity surveys to determine whether earlier cutting dates are feasible.
39. Avoid areas where birds are frequently seen. Grassland birds tend to avoid the area within 100 metres of the field edge when choosing nest sites; if possible, cut the outer edges of the field up to 100m from the field edge, or as appropriate for the size of the field, leaving the interior for later cutting.
40. Use conservative mowing practices where possible (e.g., raising mower blades to six inches or more may prevent the destruction of some nests and young in early mowing); avoid night mowing because this often kills or injures roosting birds and young; use flushing bars on haying equipment to move birds hiding in the grass).
41. In areas with high bird activity, leave small patches in late-cut fields to create refuges for nesting birds; even when young appear to have left the nest, small un-mowed patches are still needed to provide cover and feeding areas. The refuges should be as large as possible (e.g., minimum of several acres), away from forested edges that attract predators, and managed consistently from year to year. Contact Species Conservation and Management staff to learn more about Bobolink reserve practices being implemented in protected heritage places.
42. If there are multiple fields, cut fields in phases, leaving those known to support nesting birds last to allow the young to fledge.
43. Delay second cuts: cut hay early in the season in advance of the nesting period and delay the second cut by approximately 65 days (14 days for regrowth plus 42 days nesting cycle plus 9 days for young to develop flight capabilities). This strategy may be used in situations where farmers need some high-quality forage, but might have uses for lower quality late hay for dry cows or horses.
44. Burning hayfields in early spring before arrival of nesting birds can benefit grassland populations within one or two years following a burn. Burning every two to six years provides the best habitat. If possible, provide adjacent unburned grassland habitat for nesting birds during the burn year.
45. Source biodegradable netting and baler twine. To reduce entanglement by birds in bale twine or netting, contain used twine (e.g., put in bag rather than back of pick-up). Clean used twine out of fences and fields and when disposing of baling twine, cut into shorter lengths or send to a recycling service.

Livestock Management:

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[6] http://intranet2/our-work/environmental-management/pesicides/

[7] http://www.gov.mb.ca/sd/cdc/pdf/mbcdc_bird_setbacks_full_document_2014_01_22.pdf

[8] P. Gregoire 2017, pers comm. 24 January.

46. Prioritize areas of native habitat or high value habitat and defer grazing until after the majority of birds have fledged. If rotational systems are in place, keep some areas of high value habitat ungrazed during the nesting season.
47. Rotate livestock between fields to maintain 40-50% of vegetation cover as longer grass during the nesting period.
48. Allow longer intervals between grazing periods in active paddocks.
49. Ensure that grasses are not grazed below four inches in height (8-10cm), and that half of the pasture area is maintained at longer heights (12 inches or 30 cm or more) during the nesting season[9].
50. Determine appropriate stocking rates to prevent overgrazing:
    - Use science-based methods such as comprehensive range health assessments to determine appropriate stocking rates. Complete range health assessments approximately every ten years, or sooner if required by factors that could influence range health and stocking rates (e.g., dry or wet weather patterns, herd size, presence of additional ungulates, fire, changes in management regime).
    - Use stocking rates that promote range diversity and health. Variability and a range of grass heights and litter cover is desirable for grassland bird populations.
    - Avoid long-term intensive grazing that results in short, uniform grass heights, loss of litter and reduced carry-over.
    - Ensure carry-over is sufficient to maintain plant vigor and range health.
    - Maintain records of range health and in and out dates to inform future stocking decisions.
51. Set aside fallow/resting paddocks; siting these paddocks centrally, away from farm buildings and forested edges in areas with minimal encroachment by shrubs will provide the best nesting habitat.
52. Exclude livestock from key habitats such as strip cover (i.e., buffer strips of natural vegetation in the agricultural landscape), riparian, and wetland areas:
    - Use salting practices and off-site watering to draw livestock away.
    - Encourage use of resting paddocks.
    - Consider planting a living fence (e.g., native non-invasive shrubs such as willow, raspberry and hawthorn species).

Cultivated Areas:

53. Create naturalized vegetated areas around wetlands and riparian zones. Consider squaring up fields to increase riparian zone buffers and improve farming efficiency (e.g., reduce waste of seed, reduce use of pesticides and fertilizers).
54. Where possible, retain wetlands, even ephemeral wetlands (vernal pools, seasonal/temporary ponds).
55. Maintain vegetated cover and avoid bare fallowing that contributes to erosion and increases in annual weeds.
56. Follow best practices in herbicide application to avoid non-target spraying (e.g., wind speeds, time of day), apply the *Parks Canada Integrated Pest Management Directive*[10], and implement the Integrated Pest Management Plan accordingly.

Maintained Landscapes

General:

57. Apply General mitigations #1-20.
58. Refer to ECCC guidance on setback distances (Appendix 1) since there will be variety in the type of landscape and species.

Lawns and Landscaped Areas:

59. Mow lawns and conduct roadside maintenance (e.g., mowing, brushing) prior to the regional nesting period to discourage birds from nesting and maintain the area every 7 days to deter nesting or delay mowing until after young have fledged. In the case of the latter, monitor the area closely and conduct breeding activity surveys to determine whether earlier mowing dates are feasible.

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[9] The Couchiching Conservancy. *Managing Hay and Pasture to Benefit Grasslands Birds: A Preliminary Guide for Garden Landowners*.

[10] http://intranet2/our-work/environmental-management/pesicides/

60. Conduct roadside vegetation maintenance activities at the minimum acceptable frequency to maintain sight lines and eliminate physical hazards (e.g., many roadsides only require mowing every 2 to 10 years).
61. Follow the *Parks Canada Integrated Pest Management Directive*[11], and implement the Integrated Pest Management Plan accordingly.
62. Avoid areas where birds are frequently seen. Mow the outer edges of large landscaped areas, leaving the interior for later cutting to allow birds to fledge. Use of this approach and size of the outer mowed edge will depend on how the site is used by visitors, species and size of landscape area.
63. Use conservative mowing practices where possible (e.g., raising mower blades to six inches or more; use flushing bars on mowing equipment to move birds hiding in the grass).
64. Night mowing is not permitted as this often kills or injures roosting birds and young.
65. In large grassed areas with high bird activity, consider leaving unmowed patches to create refuges for nesting birds; even when young appear to have left the nest, unmowed patches are still needed to provide cover and feeding areas. Locate refuge toward the center of the area to be mowed, away from forested edges that attract predators, and leave until the nesting season is over. Refuge shape should minimize the edge to interior ratio, and should therefore be as circular or square as possible (i.e., not linear or irregular in shape).
66. As long as they do not present fire or safety hazards, keep trees with critical wildlife features (e.g., old dead trees and snags that support resting and nesting habitat) in strip habitats. In established nesting refuges, follow associated guidelines to maintain the refuge according to habitat and species (e.g., Bobolinks will avoid fields where woody shrubs and saplings exceed 25% cover so woody vegetation maintenance is required to maintain ideal nesting habitat).
67. Felling, limbing or bucking trees within riparian zones or other sensitive ecological areas will be avoided to the greatest extent possible.

Supplementary Mitigations

In the application of National BMPs, supplementary mitigations will likely be required to ensure all potential impacts are mitigated. Include any project, species, and habitat specific mitigation measures in this section (e.g., SAR that may be nesting in the area, setback distances, nesting period(s), the Parks Canada contact within the field unit for issues regarding migratory birds). **NOTE**: if the number of supplementary mitigations is considerable in extent and nature, it should be determined whether a field unit specific BMP or another impact assessment pathway (BIA or DIA) is better suited to address the impacts.

If using the BMP pathway, this BMP should be indicated in the EIA Requirement Checklist, with a note that application of the BMP will be supplemented through the addition of mitigation measures to address project or site-specific requirements. All relevant mitigations and project-specific clarifications should be included as terms and conditions in any permits and authorization documents (e.g., contracts) for the project.

[11] http://intranet2/our-work/environmental-management/pesicides/

Supplementary mitigation measures may be included here:

References

Boyd, F. 2015. Components of a Biodiversity Enhancement Plan: A Discussion of Best Management Practices (BMPs) for Pasture Operations with a Focus on Species at Risk (in part). 10 pp.

Environment and Climate Change Canada, Technical Information: https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1#_03_1. Accessed November 16, 2016.

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Appendix 1 – Buffer Zones and Setback Distances

Setback distances must be developed appropriate to the species, the level of the disturbance and the landscape context, until the young have permanently left the vicinity of the nest. The appropriate setback distance varies greatly according to the circumstances. Environment and Climate Change Canada (ECCC) should be used as the primary resource to determine setback distances. The setbacks suggested by ECCC on their website and below, are general examples and should be used as a starting point considering the factors described above. ECCC notes on its website that "The shorter distances are more reflective of urban backyards and the longer distances are more reflective of rural or natural habitats." Field unit experts, ECCC, Parks Canada Species Conservation and Management Team and the Impact Assessment Team, and qualified environmental professionals may be consulted to make this determination, with ECCC as the primary resource.

Generally, ECCC suggests the following (e-mail from P. Gregoire, Canadian Wildlife Service, Prairie Region, January 24, 2017):

- Forest: minimum 30m setback unless ground shaking heavy equipment will be used at which point it should be 50m.
- Grasslands: minimum 50m setback from songbird nests.
- Wetlands: generally up to 100m setbacks in areas without existing anthropogenic disturbances/human traffic (shorebird and waterfowl).
- Built assets: 50m in rural areas (swallows).

NOTE: ECCC advises that setbacks for sensitive species or species at risk may be substantially larger (e.g., up to 500m or more for Trumpeter Swan; 50-100m up to 200m or more for Pileated or Red-Headed woodpecker cavities; 100-150m up to 300m or more for nests of Piping Plover; 100m up to a 1000m or more for nests of Sandhill Crane.)

Resources:

Alberta Energy Regulator. 2013. Integrated Standards and Guidelines. Enhanced Approval Process. Effective December 1, 2013. http://aep.alberta.ca/forms-maps-services/enhanced-approval-process/eap-manuals-guides/documents/EAP-IntegratedStandardsGuide-Dec01-2013.pdf

Environment and Climate Change Canada. Technical Information, Buffer Zone and Setback Distances. Accessed: January 24, 2017. https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1#_03_1

Environment Canada. 2009 (Updated November 2011). Petroleum Industry Activity Guidelines for Wildlife Species at Risk in the Prairie and Northern Region. Canadian Wildlife Service, Environment Canada, Prairie and Northern Region, Edmonton Alberta. 64p. http://www.gov.mb.ca/sd/eal/registries/5526provident/attach1.pdf

Note: the updated version is not available online; it is posted in the IA Discussion Forum.: http://collaboration/sites/ea/forum/SitePages/Home.aspx

Government of Alberta. Recommended Land Use Guidelines for Protection of Selected Wildlife Species and Habitat within Grassland and Parkland Natural Regions of Alberta. http://aep.alberta.ca/fish-wildlife/wildlife-land-use-guidelines/documents/WildlifeLandUse-SpeciesHabitatGrasslandParkland-Apr28-2011.pdf

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APPENDIX X

PCA STANDARDS FOR MANAGING BATS IN PROTECTED HERITAGE PLACES

TITLE	EFFECTIVE DATE
PCA Standards for managing bats in Protected Heritage Places.	March 12th, 2018

DEFINITIONS AND ACRONYMS

Built Asset: includes buildings, fortifications and infrastructure (see Parks Canada Project Management Standard, 2016). Some built assets are used by bats as maternity roosts or hibernacula. Specific examples include buildings (attics, eaves, loose siding, shutters, walls, chimneys, cellars etc.), bridges, canals, wells, tunnels, picnic shelters, outdoor washrooms, kiosks, signs and other human-made structures where bats may be found.

Critical Habitat: means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species and posted on the Species at Risk Public Registry (*Species at Risk Act*, 2002).

Hibernaculum: typically subterranean features, such as caves, abandoned mines, wells, cellars or tunnels where light and noise levels are low and where there is airflow, relatively stable temperatures (between 2-10 ˚C) and stable, high humidity levels (>80 %). At some sites, only specific sections of the site will be used for hibernation.

Listed species: species appearing on the List of Wildlife Species at Risk set out in Schedule 1 of the *Species at Risk Act* (2002).

Maternity roost: anthropogenic structures or trees used by one or more pregnant, lactating, or post-lactating female bats and pups during the breeding season (April through August).

Residence: means a dwelling-place, such as a den, nest or other similar area or place that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating (*Species at Risk Act*, 2002).

PREAMBLE

- This document describes Parks Canada Agency standards on the management of bats in protected heritage places (PHPs).

- This standard outlines the *Species at Risk Act* requirements related to protection of individual bats, their residences and critical habitat, including hibernacula and maternity roosts, whether they are found in natural cavities or in built assets.

- This standard complements Section 8 of the *National Park General Regulations* prohibiting entrance to caves unless specifically permitted by the Field Unit Superintendent, and the *National Historic Parks General Regulations* that can be used to permit activities.

- This standard clarifies: 1) the expectation for the protection of bat hibernacula in PHPs; 2) the conditions under which access to bat hibernacula might be considered; and 3) expectations for managing individuals and maternity roosts of bats in built assets and natural sites in PHPs.

- If unable to confirm that bats found in built assets are not one of the species listed on Schedule 1 of the *Species at Risk Act*, proceed based on the assumption that they are.

- The bat hibernation and roosting periods provided herein are based on a precautionary approach and the best available information. Where there are regional data to support variation in these key periods that differ from the information provided below, field units may choose to use more regionally-relevant dates. These dates must be based on reliable, clearly-established trends using multiple years of monitoring data or on peer-reviewed literature relevant to the region in question. Decisions to work within the hibernation and roosting periods provided below must be clearly documented, with supporting evidence included.

1. STANDARDS (mandatory adherence)

1.1 Encountering Individual Bats

1.1.1 If a bat is encountered, do not to handle the individual and avoid disturbing it in case it is simply disoriented or tired. Ensure the bat has access to the outdoors if found inside, and give it some time to exit the building on its own. If after a period of time the individual is still present, and if you are Parks Canada staff, please follow the instructions from Bat Conservation International (http://www.batcon.org/resources/for-specific-issues/bats-in-buildings/removing-a-single-bat), or call a PCA Resource Conservation staff member if you are not comfortable following those instructions.

1.1.2 If bats are regularly encountered in the parts of a built asset where PCA staff are required to work or reside, contact PCA Species Conservation and Management staff to determine which avenue to use to ensure staff health and safety.

1.1.3 When restricting access to bat hibernacula (caves, tunnels etc.) for reasons of public safely, use structures such as bat-friendly gates that will not hinder bat movement.

1.1.4 A very small proportion of bats may carry the rabies virus. Infection nearly always occurs through a bat bite, although in exceptionally rare cases one can be infected through the saliva of an infected animal, if the saliva contacts an open human eye or a wound. If either event occurs, seek anti-rabies treatment as soon as possible in a medical facility.

1.1.5 If dead or injured bats are found, they should be reported to PCA Resource Conservation staff so they can be sent to the Canadian Wildlife Health Cooperative for examination for White-nose Syndrome.

1.2 Bat Hibernacula (winter use, between October and April)

1.2.1 Entrance to bat hibernacula in PHP caves that are not covered by the *National Parks General Regulations*, or to bat hibernacula in locations other than caves (tunnels etc.), shall be designated as a restricted activity when bats are present (between October and April).

1.2.2 Entry to bat hibernacula when bats are present shall only be permitted for activities identified in this standard. Permitted activities for natural hibernacula (e.g. caves) are research, inventory, monitoring, or any other activities deemed necessary for public safety or bat conservation purposes. Permitted activities for human-made hibernacula (e.g. tunnels) additionally include maintenance. If maintenance is required in hibernacula in built assets, use the 'PCA Decision Tool for Dealing with Bats in Built Assets' to determine how to proceed (see Appendix 1).

1.2.3 Anyone authorized to enter a bat hibernaculum when bats are present must minimize disturbance to bats. Anyone authorized to enter a bat hibernaculum must at all times

comply with the Canadian Wildlife Health Cooperative Decontamination Protocol to minimize risk of spreading White-nose Syndrome (see References).

1.3 Bat Roosts (spring/summer use, between April and September)

1.3.1 If roosting bats are found in a built asset requiring work, use the 'PCA Decision Tool for Dealing with Bats in Built Assets' to determine how to proceed (see Appendix 1).

1.3.2 Natural bat maternity roosts (in trees, etc.) should be maintained. Vegetation around the maternity roost should be retained to maintain the environmental conditions around the roost.

1.3.3 Any major increases in activity, noise level or artificial lighting should be avoided around maternity roosts when bats are present.

2. ACCOUNTABILITY

2.1 The Field Unit Superintendent is accountable for ensuring compliance with these standards.

3. EVALUATION

3.1 The Director, Natural Resource Conservation, shall undertake periodic review of this Standard and deficiencies and ambiguities in the Standard shall be corrected in a timely fashion.

4. ASSOCIATED REFERENCES

- Canadian Wildlife Health Cooperative decontamination protocol – printed format, most recent version (http://www.cwhc-rcsf.ca/wns_resources.php)
- Canadian Wildlife Health Cooperative decontamination protocol – Parks Canada video format (https://www.youtube.com/watch?v=kQjALbixJKY)
- PCA National Best Management Practices for Management of Bat Maternity Roosts in Built Assets (http://collaboration/sites/ea/BMP%20Library/Bat%20Maternity%20Roosts%20in%20Built%20Assets.docx)
- Parks Canada Project Management Standard, 2016 (http://intranet2/our-work/project-management-office/project-management-standard/)
- *Species at Risk Act* (2002): http://www.sararegistry.gc.ca/default.asp?lang=En&n=8BB77EC2-1
- Species at Risk Public Registry: http://www.sararegistry.gc.ca/

5. APPENDIX

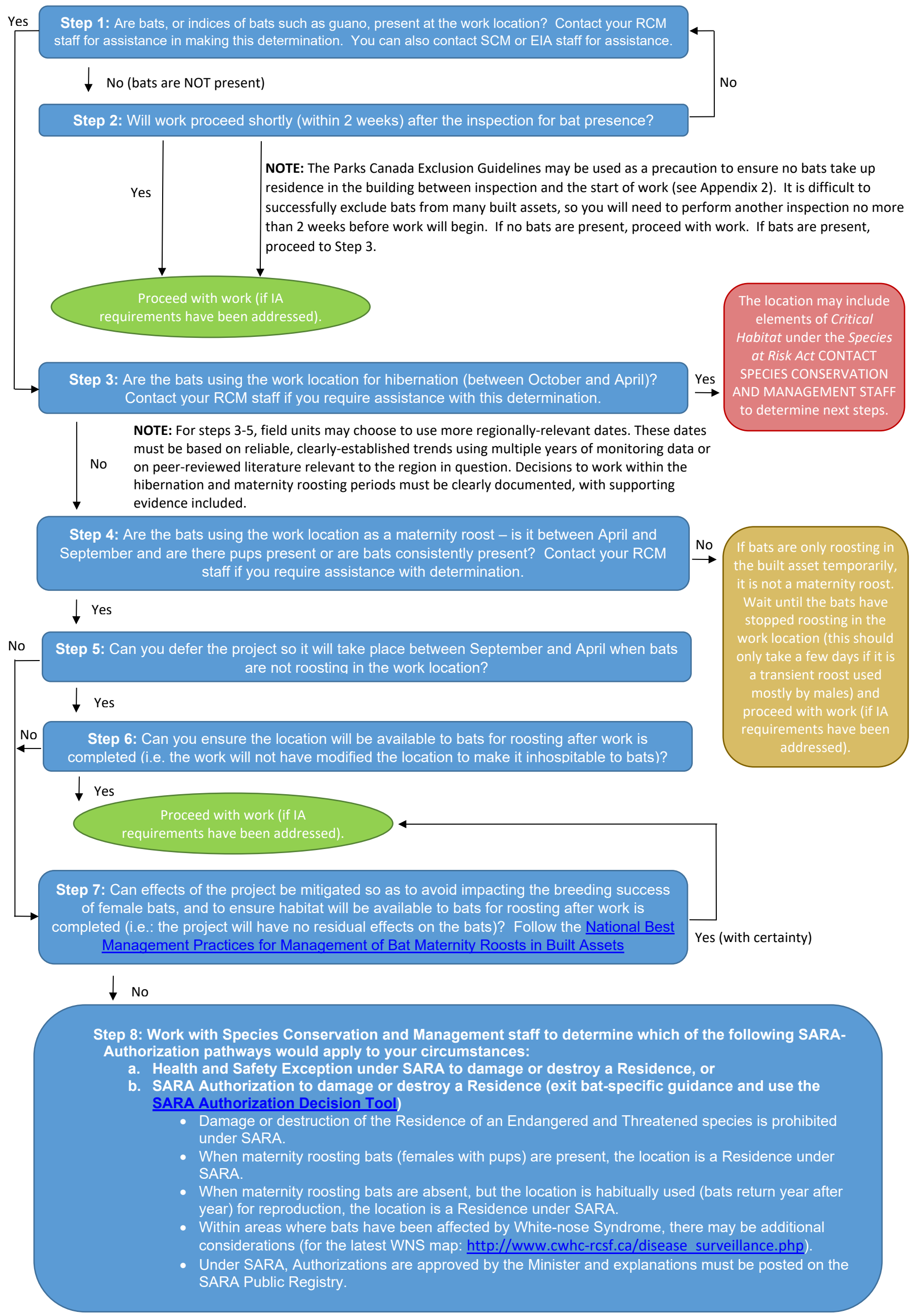
- Appendix 1: PCA Decision Tool for Dealing with Bats in Built Assets
- Appendix 2: Parks Canada Bat Exclusion Guidelines Adapted from Bat Conservation International

APPENDIX 1: PCA DECISION TOOL for Dealing with Bats in Built Assets

Purpose: This PCA Decision Tool for bats using built assets provides support to Field Units doing work on built assets that may affect bat species listed under the *Species at Risk Act*. Built assets include buildings, fortifications and infrastructure. Some built assets are used by bats as maternity roosts or hibernacula. Specific examples include buildings (attics, eaves, loose siding, shutters, walls, chimneys, cellars, etc.), bridges, canals, wells, tunnels, picnic shelters, outdoor washrooms, kiosks, signs and other human-made structures where bats may be found. Where field units are considering taking action to address situations where staff are interacting with bats in their workplace or park residence, they must contact SCM staff to determine which options are available to them before proceeding.

SARA Considerations: If bats are present, assume they are one of the three species listed as Endangered under Canada's *Species at Risk Act* (Little Brown Myotis, Northern Myotis, Tri-coloured Bat), unless a bat expert confirms otherwise.

Acronyms: Environmental Impact Analysis (EIA), Impact Assessment (IA), Resource Conservation Management (RCM), *Species at Risk Act* (SARA), Species Conservation and Management (SCM).



APPENDIX 2: Parks Canada Bat Exclusion Guidelines Adapted from Bat Conservation International

NOTE: The following exclusion guidance is adapted from the guidance provided by Bat Conservation International. It is recommended that PCA staff use the exclusion guideline presented herein rather than search out the Bat Conservation International guidelines because there are options presented by Bat Conservation International that are not endorsed by Parks Canada. Some options are inappropriate for use within a protected heritage place and could lead to contraventions with federal legislation. For example, in addition to traps, ultrasonic devices, chemical repellents and smoke, Parks Canada does *not* approve the use of aerosol repellants or naphthalene (i.e., **moth balls) as bat deterrents or exclusion methods.**

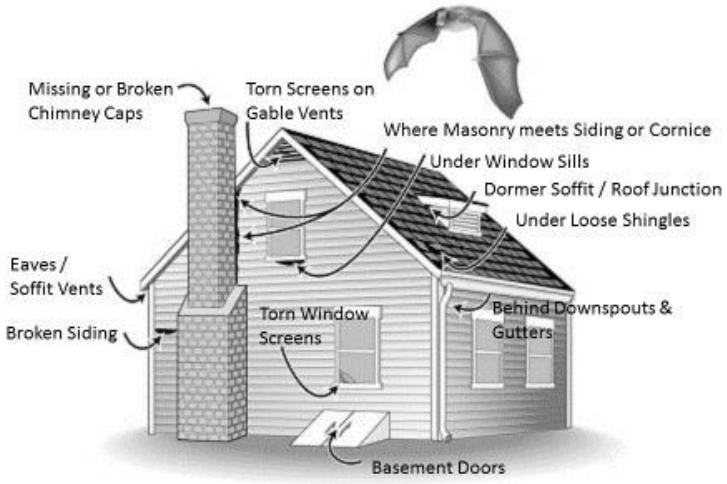
1.1 If bats move in

As bats lose their natural roosts in trees and caves, they are sometimes forced to seek shelter in human-made structures. There is little reason to evict these highly beneficial animals unless they are causing a problem or are considered a nuisance. Bats should, however, be prevented from entering human living quarters.

Permanently – and humanely – evicting bats from buildings is not particularly difficult, but it requires patience and attention to detail. You may be able to do it yourself with the following detailed instructions. Or you may prefer to contact a bat-exclusion professional. We can help you choose a reliable company that will protect the bats AND your family.

1.2 Where bats roost in buildings

Bats may roost in attics, soffits, louvers, chimneys and porches; under siding, eaves, roof tiles or shingles; and behind shutters (see diagram). In stadiums and parking garages, bats sometimes roost in expansion joints between concrete beams.



Most North American bats have small teeth for eating insects and do not gnaw through wood or other building materials like rodents. But they can enter buildings through openings as small as one-half inch (1.3 centimeters) in diameter. Common entry points include open windows or doors, broken or poorly fitted screens, open soffits, loose or missing roof shingles or tiles, places where flashing or boards have come loose and where pipes or wiring enter buildings. Openings often occur where walls meet the eaves at the gable ends of an attic, where porches attach to a house or where dormers meet the roof. Other points of entry are associated with siding. For example, cracks and crevices are often created where siding forms corners or where it meets windows, doors or chimneys.

The existence of roosting bats in buildings is sometimes indicated by the presence of black or brown stains from body oils or droppings (guano) around cracks or crevices. Bat droppings may also appear on walls, under porches or decks, or beneath dilapidated ceilings. Bat guano may resemble small, hard rodent pellets; but it is soft, easily crushed to reveal shiny insect parts and does not contain any white material.

1.3 **Evicting bats from buildings**

Excluding bats from buildings requires establishing one-way exits through which the bats can leave but cannot return, while also sealing all other potential entry points. This process of eviction and exclusion is the only effective and permanent solution when bats in a building are unwanted.

Trapping and relocating is ineffective since bats have powerful homing instincts and will simply return, even when released at great distances. The use of pesticides against bats is illegal and counterproductive, and greatly increases the likelihood of bats coming into contact with people and pets.

1.4 **Preventing access**

Small bat colonies can usually be tolerated and simply left alone, but bats should always be prevented from entering human living quarters.

The first step in exclusions is to inspect the building's interior for small openings through which bats could enter. All openings connecting the attic or other potential roosting areas to living quarters should be sealed, while entry points on the outside of the building are left open. Caulking, flashing, screening or insulation can be used to seal most openings on the inside. Draft guards should be placed beneath doors to attics; electrical and plumbing holes should be filled with steel wool, caulking or weather stripping.

Caulking, flashing, screening or heavy-duty mesh can be used to bat-proof most openings on the outside. Expanding foam or similar products should never be used to seal cracks in a building where bats are active because they can become caught in it. Caulking should be water-based and applied early enough in the day so it has time to dry before bats emerge in the evening.

Never simply wait for bats to fly out at night and then seal openings. Not all of the bats leave at the same time, and some may remain inside all night, especially during storms. Instead, use tubes as one-way valves that allow bats to leave, but not to re-enter. These valves (or exclusion devices) must be placed over all openings that bats use to enter and exit. Valves may be constructed from well-cleaned caulk tubes or plastic pipes. These exclusion devices should be left in place for a minimum of seven nights and in some cases, two full weeks to ensure that all bats have left the building. After careful observation to be sure all bats have left, the one-way valves may be removed and the openings sealed.

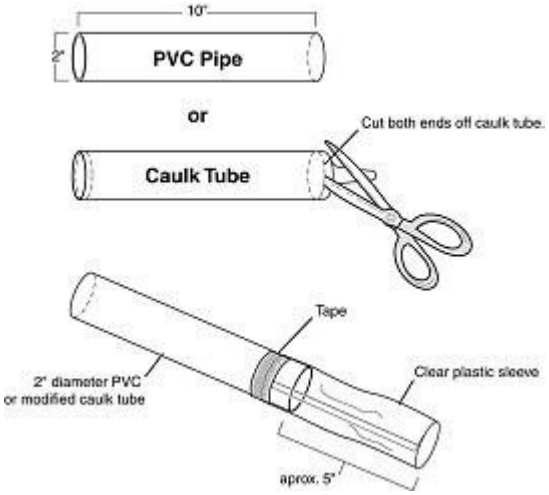
What about baby bats?
Bats often roost in buildings during maternity periods, when they give birth and raise their pups. Exclusions should not take place until young bats are able to fly; otherwise, they will be trapped inside, away from their mothers, and die of starvation. Separating pups from their mothers may also lead mother bats to search for other entrances to reach their young.

In North America, the maternity season begins as early as April. Young bats are flying by late August. Exclusions should not be conducted between April and late August.

Most house-dwelling bats migrate to warmer climates or enter caves or abandoned mines to hibernate in the late fall. However, a few species can hibernate in buildings. If hibernating bats are present in cold regions during the winter, exclusions should be postponed until spring when they emerge to feed. In mild climates, some bats may remain active year-round, but exclusions should be carefully monitored or avoided during periods when night temperatures fall below 50 degrees F (10 degrees C).

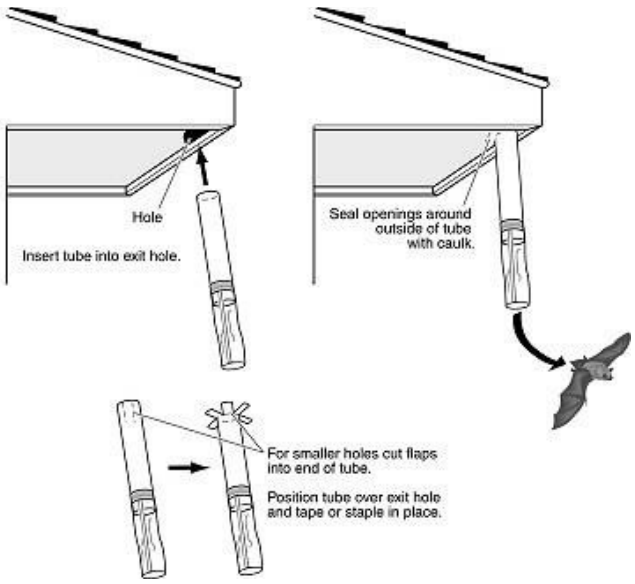
1.5 Excluding bats with tubes

In most cases, tubes make the best bat-exclusion devices. These include openings on buildings with rough exterior walls, such as brick or stone houses and log cabins. Tubes also work best for holes at corners where walls meet and on horizontal surfaces such as soffits.



Exclusion tubes should have a diameter of two inches (five centimeters) and be about 10 inches (25.4 centimeters) in length. Exclusion devices can be purchased commercially or made from PVC pipe or flexible plastic tubing. Bats are unable to cling to the smooth surface of these tubes, so the tube should project no more than one-quarter inch (six millimeters) into the opening. This will ensure exiting bats can easily enter the tube. Laura Finn of Fly By Night Inc., says empty caulking tubes also work well after caps at both ends have been cut away. Caulking tubes must be thoroughly cleaned before they can be used for exclusions because dried caulk forms a rough surface that could allow bats to reenter. These flexible, plastic tubes let you squeeze one end so it fits into a crevice. Or you can cut one end into flaps that fit over an opening and can be caulked, stapled, nailed or screwed into place (see diagram).

Once the tube has been secured over the hole, a piece of lightweight, clear plastic can be taped around the tube's outside end (see diagram) to further reduce the likelihood of bats reentering, though this is usually not necessary.

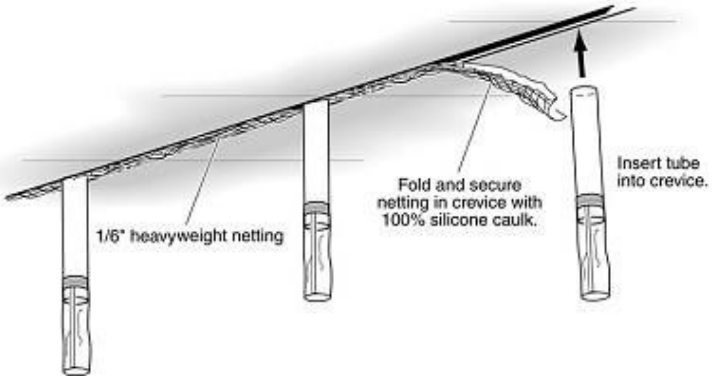


Plastic sleeves collapse on themselves, preventing bats from re-entering once they have crawled out through the tube. After the tube has been secured into or over an opening used by bats, any spaces between the outer rim of the tube and the building must be sealed shut. Also be sure to seal any other openings in the building that bats could use. Leave the tube in place for a minimum of seven days to ensure all bats have left. After the bats have been excluded, the tube should be removed and the opening permanently sealed with silicone caulking, caulk-backing rod, hardware cloth or heavy-duty plastic mesh. In some cases, sealing may require repair or replacement of old, deteriorated wood. When bats are using multiple openings to enter and exit, exclusion devices should be placed on each opening. If the bats do not appear to be exiting or seem to be having trouble doing so, add new valves as needed.

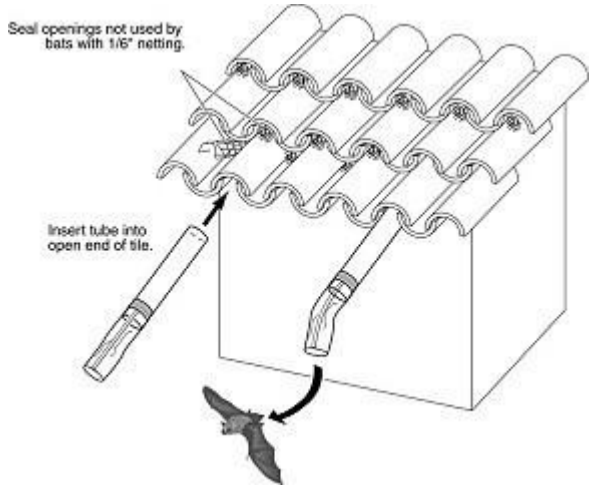
1.6 **Special situations**

Multiple exclusion tubes are often required to exclude bats from large structures or problem roofs.

When bats are roosting in long crevices, such as those found in some parking garages, exclusion tubes should be placed every few feet along the length of each crevice or in every discrete section to ensure all bats can easily exit through the valves. The spaces between the tubes should be bat-proofed with heavyweight mesh (see diagram). Fold the netting so it fits into the crevice and caulk it in place as shown. The same procedure can be used for crevices created where flashing has pulled away from a wall.



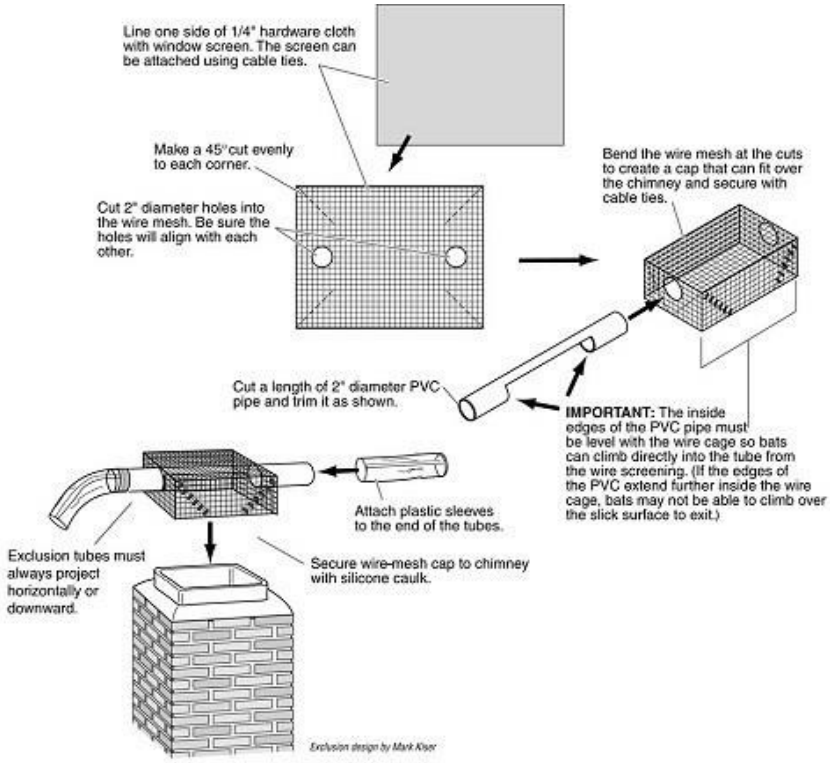
Plastic tubes also work well for excluding bats from under Spanish (clay) or concrete roofing tiles. Bats typically enter through open ends on the lowest row of tiles or through openings created where tiles overlap. Exclusion tubes should be placed at all active openings (see diagram). Collapsible plastic sleeves should also be attached to the ends of the tubes. Heavyweight plastic netting can be folded and inserted into spaces where tiles overlap (see diagram).



Bats may also enter a building through spaces beneath corrugated or galvanized roofing sheets. These roofs can be sealed with a variety of materials after bats have been excluded.

Special modifications may be needed when bats roost in chimneys or in spaces between a chimney and roof. If bats are roosting inside the chimney, build a wire cage from quarter-inch hardware cloth lined with window screen. A section of PVC pipe can be inserted through holes cut into the sides of the cage (see diagram). Although bats are able to drop down and out of a vertically placed tube that extends below the roost, they cannot grip the slick surface to crawl out if the tube extends upward above the roost.

Therefore, the tubes should project either horizontally or downward. A collapsible plastic sleeve should be placed over the ends of all horizontal tubes. Once the bats have been excluded, a chimney cap should be installed.



1.7 **Roosting on porches**

Bats sometimes roost briefly at night on porches or under overhangs while they digest insects they've eaten. These temporary roosts should usually be tolerated unless the bats are considered a nuisance. Mylar balloons, strips of aluminum foil or ribbons hung from the porch ceiling and allowed to move in the breeze may also discourage bats from roosting in that area.

1.8 **Installing a bat house**

When excluding bats from a building, it's important to provide bats with a new place to live. Visit the Bat House section of our website for free plans if you want to build your own bat house, or buy one from our list of certified bat house vendors.

1.9 **Guidelines for hiring a professional bat excluder**

Bat Conservation International promotes exclusion methods that ensure the safety of both bats and people.

Bat exclusion professionals should be licensed by the states in which they work, be insured and use only approved exclusion methods. They should also provide the property owner with a guarantee and list of references. All written materials should be accurate and scare tactics should be avoided.

One-way tube-type excluders are the preferred methods for evicting bats from buildings. Exclusion devices should be placed at all entry points and should remain in place for a minimum of seven days. These devices should be removed after all bats have been excluded, and exclusion points should then be sealed. BCI strongly recommends that exclusion professionals avoid spot treatments. Moving bats from one corner of a building to another does not solve the problem and may require further exclusions in the future.

Please note that simply waiting until the bats have flown out at night and then permanently sealing entrances without the use of exclusion devices is not approved by BCI. This method often traps some bats inside the building. BCI also discourages the use of "permanent netting" in most situations. For night roosts, we also recommend the use of Mylar balloons or strips of tin foil hung from roosting areas and allowed to move in the breeze.

Maternity season for bats in the US and Canada can range from April through August. Eviction of bats, or any activity that directly affects their roosting area, should occur only before or after the maternity season, when young will not be trapped inside.

Some bats hibernate in buildings during winter months. Winter exclusions should be performed only if it can be determined that no bats are hibernating in the building. If bats are present during the winter, exclusions should be postponed until spring temperatures are warm enough for deciduous plants to leaf out and insects to again be abundant.

Ultrasonic devices, chemical repellents and smoke are not approved by BCI.

Traps and relocation are not BCI-approved exclusion techniques; however it is acceptable to capture a single bat for species ID or to remove an individual bat from a living space.

1.10 **Bat roosting deterrents (to be employed only when bats are NOT present)**

- Mylar Balloons floating near the roost
- Strips of mylar material or even tin foil tacked up at the roost so they move in the breeze
- Curling ribbon (long pieces, curled and tacked at the roost)
- Vaseline (or some other slick substance that make gripping the roosting place difficult)
- Plastic taped over the roosting spot (to make it too slick for their feet to hold on and hang there)
- Bright lights and fans

These ideas are intended for night roosting bats (i.e., bats roosting under eaves of a roof or on a porch, etc., digesting the insects they have eaten), and the idea is for the bats to develop new habits. Day-roosting bats are typically in nooks, crannies, and crevices and must be properly excluded.

APPENDIX XI

NATIONAL BEST MANAGEMENT PRACTICES FOR MANAGEMENT OF BAT MATERNITY ROOSTS IN BUILT ASSETS

National Best Management Practices for Management of Bat Maternity Roosts in Built Assets

Scope of Application:	This Best Management Practice (BMP) applies to the maintenance and modification of Parks Canada built assets used by bats as maternity roosts. It is part of a suite of Parks Canada tools to manage bats including the *Standards for Managing Bats in Protected Heritage Places* and the *Decision Tool for Dealing with Bats in PCA Built Assets* (Annex 1 in the Standard). Adherence to the Standard is mandatory. Specifically, this BMP supports Step 7 of the *Decision Tool for Dealing with Bats in PCA Built Assets*. **It should be used when projects are conducted during April - September[1] at built assets used as maternity roosts.** The intent of the BMP is to provide mitigation measures to avoid impacting the breeding success of female bats, and to ensure the habitat will be available to bats for roosting after work is completed. Encounters with individual bats, at any time of the year, should be handled according to Section 1.1 of the *Standards for Managing Bats in Protected Heritage Places*. Built assets can serve as roosting or hibernating habitat or temporary shelter for bats, especially in areas where suitable natural shelters are limited or absent. Built Assets include buildings, fortifications and infrastructure. Specific examples where bats may be found include buildings, attics, eaves, loose siding, shutters, walls, chimneys, cellars, bridges, canals, wells, tunnels, picnic shelters, outdoor washrooms, kiosks, signs, and other human-made structures. Examples of maintenance and modification activities at built assets include: • Repair of building envelope (e.g., windows, roofing, siding, eavestrough) and all associated activities (e.g., painting, pressure washing). • Interior upgrades and renovations (e.g., painting, woodwork, window replacement, insulation). • Expansion of building footprint. This BMP applies to the Little Brown Myotis, Northern Myotis and Tri-colored Bat, all recently added as Endangered species under the *Species at Risk Act* (SARA) due to the threat of White-nose Syndrome (WNS). In Canada, WNS is

[1] Field units may choose to use more regionally-relevant dates. These dates must be based on reliable, clearly-established trends using multiple years of monitoring data or on peer-reviewed literature relevant to the region in question.

	currently found in Ontario and eastward (except Newfoundland and Labrador) and in central, eastern and recently western United States. The disease is spreading rapidly and resulting in very high mortality. The *Species at Risk Act* (SARA) prohibits the killing, harming, harassment, capture or taking of a SARA-listed endangered species, the damage or destruction of its residence and the destruction of any part of its critical habitat. Bats are most vulnerable during summer, when mothers and pups are in maternity roosts (April-September) and winter, when males and females are hibernating (October-April). One or more of the three aforementioned bat species can be found in most Parks Canada protected heritage places south of the tree line. Little Brown and Northern Myotis are found throughout most Canadian provinces and territories except Nunavut. Tri-colored bats are found in the eastern provinces. As such, it is important to adhere to the legal requirements under SARA to protect bats at all Parks Canada built assets. If bats are encountered, assume they are one of the three SARA-listed endangered species unless a bat expert confirms otherwise. If a built asset such as a cellar or tunnel is used by bats for hibernation, generally between October and April, the location may include elements of Critical Habitat under SARA. As such, this BMP will not apply and you must contact Species Conservation and Management staff to determine next steps. There is a three tiered approach to managing bats in built assets used as maternity roosts, ranging from highest to lowest recommendation from both a bat conservation and project management perspective: 1. Conducting work outside of the breeding season is the recommended approach and should be chosen when at all feasible. 2. Conducting work during the breeding season and implementing Section 2 mitigation measures #10-17 of this BMP is the second choice option if the first is not feasible. 3. Excluding bats and implementing Section 2 mitigation measures #19-22 should only be considered as a last resort and should be a temporary measure (i.e., exclusions will be removed after work is completed and bats will again have access to the built asset).
Exceptions:	This BMP does NOT apply if the project will have residual effects on bats. The following are examples of excluded projects (refer to Step 8 of the *Decision Tool for Dealing with Bats in PCA Built Assets* if any of the following applies): • Demolition of built assets used by bats. • Alteration of a built asset such that bats can no longer access the asset and use it as a maternity roost after work is completed. • Any activities resulting in negative impacts to the breeding success of female bats (repeated flushing from the roost, abandonment of pups,

	restricted access in/out, change in temperature or ventilation requirements). • Any project or activity impacting a bat hibernaculum. Consult the Species Conservation and Management Team: • To conduct further analysis should any of the above exceptions apply to the project. • To determine whether conditions can be met to obtain a Health and Safety Exception under SARA or a SARA Authorization to damage or destroy a Residence if bats are using the location for breeding and impacts cannot be mitigated. • To determine next steps if bats are using the location for hibernation since it may include elements of Critical Habitat under SARA. • To address any uncertainty regarding potential adverse effects to bats or how to apply the *Decision Tool for Dealing with Bats in PCA Built Assets*. • To address impacts to bats unrelated to maternity roosts. **Note:** All other natural resource and cultural resource impacts must be addressed in combination with other BMPs or through another environmental impact analysis (EIA) pathway. Some or all of the mitigation measures in this BMP may be used to prepare a BIA or DIA.
Approved geographic area of application:	This BMP is intended for use in all Parks Canada administered protected heritage places.

Effects Assessment and Mitigation

Components of the environment that may be affected:	**SARA–listed Little Brown Myotis, Northern Myotis, and Tri-coloured Bats:** Maternity roosting bats and individual roosting bats can be negatively affected by work including: • Direct mortality or injury to roosting females, pups or individual males. • Mortality or distress caused by disturbance to roosts; changes in ventilation; paint fumes, odours or toxins from project work; and excessive noise or light disturbance. • Blocked access to roost sites.
Mitigation Measures:	**1) General** 1. During breeding season and on the fringes of breeding season, the presence/absence of bats in the built asset must be confirmed, within two weeks of commencing work. Use of acoustic monitoring equipment is recommended. Presence/absence checks must be completed by qualified individuals familiar with bat ecology and bat roosts within the ecoregion of the built asset. If such an individual is not available in the field unit, an

	external specialist is required. Results must be documented and provided to the designated Parks Canada contact[2] prior to work commencing. 2. All on-site personnel must review the mitigation measures and any special requirements with the designated Parks Canada contact before work begins. 3. If a bat is found in a built asset while work is taking place, stop work and notify the designated Parks Canada contact. Leave the bat to exit on its own; ensure it has access to the outside via open door(s) and/or window(s). The designated Parks Canada contact will need to evaluate whether the bat is passing through or using the location as a maternity roost to determine next steps. 4. If the bat does not leave the asset in a reasonable amount of time, safely capture and release it outside following the instructions in Appendix 1. Generally, handling bats should be avoided if at all possible, this method of capture and release should be a last resort option. Note: This mitigation applies to individual bats; physical removal of multiple bats to prepare a site for work is not permitted. In this case, approved exclusion techniques would be required. 5. If dead or injured bats are found, leave them as found and report it immediately to the designated Parks Canada contact. Qualified Parks Canada staff should safely collect (i.e., wear gloves) dead bats to be tested for WNS as per section 1.1.4 of the Parks Canada *Standards for Managing Bats in Protected Heritage Places*. Injured bats should be assessed by the appropriate regional wildlife authorities. 6. Chemical pesticides and repellants must never be used directly on bats or in maternity roosts, whether bats are present or not. 7. No traps of any kind are to be used at maternity roosts, whether bats are present or not. 8. Bat access points (entry and exit) and building ventilation to maternity roosts must be retained to enable future use by bats. For example: o Spray insulation must not be used in structures where bats are present; access points cannot be easily maintained and fumes may have a negative impact on bats. o When installing roof insulation, ensure that bat access points are retained; keep the insulation a minimum of 10 cm from the eaves to help ensure access and to maintain building ventilation. o When installing insulation within the cavity walls of a building, start from the bottom of the cavity wall and work upwards to ensure any bats which may still be remaining are given the chance to escape. If feasible, leave a gap at the top of the cavity wall for bats. o Access points must be created as close as possible to the original ones, and care taken to ensure that corresponding gaps are inserted into any roofing felt or membrane. o At a minimum, at least one entry/exit point, the one most used by the bats, must be available following completion of the project.

[2] This would be whoever it is within the field unit with authority and mandate to make decisions on bat management (e.g., for National Historic Sites and Parks, Resource Conservation Manager/staff; for the Historic Waterways, the Waterway Environmental Assessment Officer; and for Jasper, Banff, Lake Louise, Yoho and Kootenay National Parks, the Integrated Land Use Policy and Planning Manager. Identify who this is in Section 4: Supplementary Mitigations.

NOTE: Continuity of membranes and air barriers is crucial to building envelope performance. Where maintaining existing bat access points significantly compromises the integrity of the building envelope, make provisions in the building envelope design to maintain modified bat access points. Submit any proposed changes to existing bat access points to the designated Parks Canada contact for approval.

2) Work undertaken at the location of an active maternity roost (April - September[3]):

Scenario 1: Work takes place in a part of the built asset separate from the roosting bats (e.g., in a room adjacent to the space where mothers and pups are roosting) and/or nature of the work is non-invasive and will not cause disturbance[4].

9. Implement General mitigations #1-8.
10. A notice clearly identifying areas used by bats must be erected and maintained at the built asset for the duration of the work period.
11. Inspect the immediate work area prior to commencing work each day to identify presence of bats.
12. Contain and dispose of any contaminated, toxic or hazardous materials immediately as it may affect the maternity roost. Remove to an approved facility as soon as possible.
13. Bat access (exit and entry) to the roost and ventilation requirements must be met at all times. Refer to mitigation #8.
14. Minimise vibration, noise and light to the maximum extent possible. For example:
    - Limit use of machinery and turn off machinery when not required.
    - Combustion equipment, such as generators, pumps, and vehicles should not be parked or operated close to the roost.
    - Conduct work during daylight hours and use red lights if work must be conducted in the evening.
    - Avoid artificial lighting around maternity roosts and alternative roosts especially light shining directly on the roost, its access points and the flight paths away from the roost.
    - If it is absolutely necessary to have lights on near the access points of the roost, switch lights off at bat emergence time and during peak bat activity times (dusk and dawn) or dim lights (e.g. to 30% power) for periods of the night to reduce illumination and spill.
    - Minimise clearing and grubbing activities near the roost.
    - Avoid human presence or activity directly under the roost entry point(s).
15. Minimise odours, fumes and dust to the maximum extent possible. Consider the following if feasible and appropriate:

[3] Field units may choose to use more regionally-relevant dates. These dates must be based on reliable, clearly-established trends using multiple years of monitoring data or on peer-reviewed literature relevant to the region in question.

[4] Disturbance can result from any activity (e.g., noise, light, significant changes in temperature or ventilation) that alters the behavior an individual or group of bats (e.g., flushing from the roost, mothers abandoning pups).

	○ Seal off the work area. ○ Install air filtration units. ○ Use environmentally safe and non-toxic construction materials (i.e., paint, sealant, wood). 16. If altering the landscape (e.g. vegetation maintenance, clearing activities) around a maternity roost is absolutely required, ensure linear features such as tree lines and hedgerows are maintained to support bat navigation, foraging area and cover from predators. 17. The Environmental Surveillance Officer and/or other designated Parks Canada contact must monitor bat behaviour for the duration of work and ensure pups are not abandoned by their mothers. If work causes bats to leave the built asset, work must stop immediately and be modified to ensure their return. Scenario 2: *Last Resort Option* - Disturbance to the maternity roost cannot be avoided or minimised, either through the nature of work or location, therefore, exclusion techniques and alternative roost habitat (bat houses) is required. 18. Implement General mitigations #1-8. 19. Ensure that Parks Canada approved alternative roost habitat and exclusion techniques are implemented in advance of the arrival of bats in April for the breeding season. 20. Alternative roost habitat[5] must be built and located in approved locations *before* the exclusion process is implemented to encourage use by bats. The alternate habitat should be installed in the spring, ideally a season prior to work commencing. Refer to Appendix 2 for guidelines on alternative roost habitat. 21. Follow Bat Conservation International guidelines for humane bat exclusion (Appendix 3). To avoid unnecessary injury or death to bats: ○ Implement one-way exclusions to prevent bats from entering the building and to encourage use of alternate habitat. ○ Exclusion techniques must be implemented when bats are confirmed *not* to be present (i.e., *before* the start of the reproductive season in April). ○ Qualified Parks Canada or external bat experts must evaluate success of exclusion techniques at least 2 weeks prior to work commencing. ○ Work must not proceed unless exclusion techniques have been successful. ○ Ultrasonic devices, smoke, traps, or chemical repellants (e.g., pesticides, aerosol sprays, moth balls) must never be used to exclude bats from structures. 22. Alternative roosts can be left up after work is completed, but the original roost site must also be available for bat use after the work has been completed.

[5] Alternative roosts (e.g. bat boxes) are not a universal solution and are not to be interpreted as a suitable, one-to-one replacement for roosts. This type of compensatory mitigation should only be considered once all avoidance and minimization options have been exhausted. Only a small percentage of alternate roosts are successfully occupied, so the risks of non-adoption by bats must be minimized by careful design and site selection that mimics the original roosting conditions, particularly thermal properties and access.

	3) Supplementary Mitigations In the application of National BMPs, supplementary mitigations will likely be required to ensure all potential impacts are mitigated. Include any site-specific mitigation measures in this section (e.g., the designated Parks Canada contact within the Field Unit for issues regarding bats). NOTE: if the number of supplementary mitigations is considerable in extent and nature, it should be determined whether a Field Unit specific BMP or another EIA pathway is better suited to address the impacts. In this circumstance, the relevant BMP should be indicated in the EIA Requirement Checklist, with a note that application of the BMP will be supplemented through the addition of mitigation measures to address project or site-specific requirements. All relevant mitigations and project-specific clarifications should be included as terms and conditions in any permits and authorization documents (e.g., contracts) for the project. Supplementary mitigation measures may be included here:

References:

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Associate Vice-President, Asset Management and Project Delivery Approval

Name: Kalvin Mercer	Date: September 19, 2016
Signature: Original signed by Kalvin Mercer	

Director Natural Resource Conservation Branch Approval

Name: Nadine Crookes	Date: September 19, 2016
Signature: Original signed by Nadine Crookes	

Last Update: May 4th, 2018

Appendix 1 - Guidelines for Removing a Bat from a Building - Adapted from Bat Conservation International

- Always wear gloves and long sleeves when handling bats.
- Wait until the bat lands, then cover it with a small, ventilated box or other ventilated container. Slip a piece of cardboard between the wall and the container, gently trapping the bat inside. Wait until nightfall and, with the bat inside the cardboard-covered container, take it outdoors and release it.
- Note that most bats cannot take flight from the ground so they must be released from a vantage point off the ground. The bat can be released by holding the container aloft, lifting the lid and gently tilting the container to the side. The bat should fly out and away. If not, hold the container against a high wall or the branch of a tree and slowly remove the cardboard. After a few moments, the bat should crawl out, cling to the surface and can be left there. If the bat has been kept in a cool place it might be in torpor so cannot fly away. For this reason it is best set it up somewhere high off the ground and let it fly away on its own when it has warmed up.
- If the bat appears unable to fly and falls to the ground, it may be injured or sick. In that case, gently return it to the box, cover it and contact the designated Parks Canada contact for further direction.

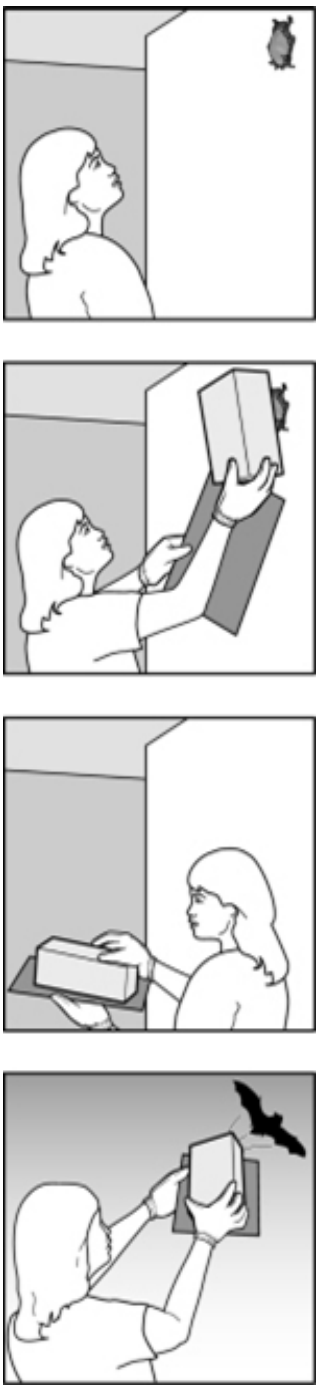


Figure 1: Removing a bat from inside a building.

Source: http://www.batcon.org/resources/for-specific-issues/bats-in-buildings/removing-a-single-bat

Appendix 2 – Guidelines for the Construction and Maintenance of Alternative Roosts

The following guidelines must be applied for the construction and maintenance of alternative roosts:

a) Alternative roosts (i.e., bat boxes) are intended for use by bats during work activities, however, they may be left in place as a roost site option in addition to the built asset, when work is completed.
b) Alternative roosts are not suitable as replacements for roost sites that will be destroyed or permanently removed from use.
c) To maximize their effectiveness, alternative roosts should replicate, as closely as possible, the roost being replaced. Alternative roosts should be situated close to the original roost and on flight lines to be noticeable, painted black to maximize heat absorption, and placed at a location of similar height and aspect to the original roost (no less than 10 feet off the ground and in a location where they will receive a minimum of 8 hours of direct sunlight each day). Ideally, more than one alternate roost should be provided to improve the likelihood that one will have the right conditions to attract roosting females. For more information on alternative bat roosting habitat, refer to Bat Conservation International's webpage on bat houses building and installation: (http://www.batcon.org/resources/getting-involved/bat-houses).

Appendix 3: Parks Canada Bat Exclusion Guidelines Adapted from Bat Conservation International

NOTE: The following exclusion guidance is adapted from the guidance provided by Bat Conservation International. It is recommended that PCA staff use the exclusion guideline presented herein rather than search out the Bat Conservation International guidelines because there are options presented by Bat Conservation International that are not endorsed by Parks Canada. Some options are inappropriate for use within a protected heritage place and could lead to contraventions with federal legislation. For example, in addition to traps, ultrasonic devices, chemical repellents and smoke, Parks Canada does *not* approve the use of aerosol repellants or naphthalene (i.e., **moth balls) as bat deterrents or exclusion methods.**

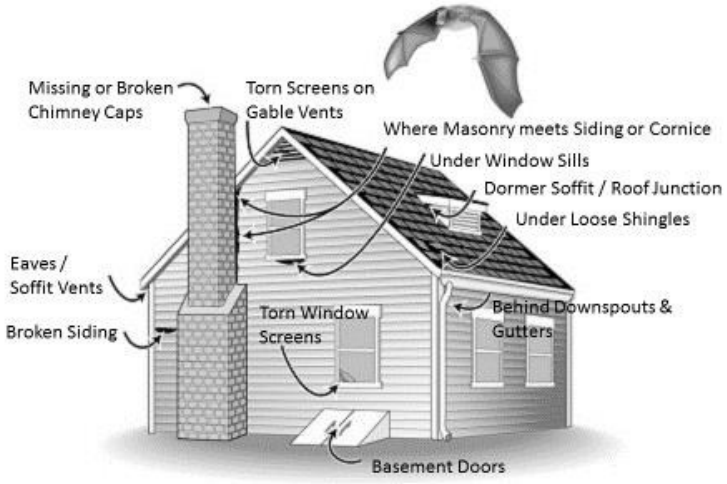
1.1 If bats move in

As bats lose their natural roosts in trees and caves, they are sometimes forced to seek shelter in human-made structures. There is little reason to evict these highly beneficial animals unless they are causing a problem or are considered a nuisance. Bats should, however, be prevented from entering human living quarters.

Permanently – and humanely – evicting bats from buildings is not particularly difficult, but it requires patience and attention to detail. You may be able to do it yourself with the following detailed instructions. Or you may prefer to contact a bat-exclusion professional. We can help you choose a reliable company that will protect the bats AND your family.

1.2 Where bats roost in buildings

Bats may roost in attics, soffits, louvers, chimneys and porches; under siding, eaves, roof tiles or shingles; and behind shutters (see diagram). In stadiums and parking garages, bats sometimes roost in expansion joints between concrete beams.



Most North American bats have small teeth for eating insects and do not gnaw through wood or other building materials like rodents. But they can enter buildings through openings as small as one-half inch (1.3 centimeters) in diameter. Common entry points include open windows or doors, broken or poorly fitted screens, open soffits, loose or missing roof shingles or tiles, places where flashing or boards have come loose and where pipes or wiring enter buildings. Openings often occur where walls meet the eaves at the gable ends of an attic, where porches attach to a house or where dormers meet the roof. Other points of entry are associated with siding. For example, cracks and crevices are often created where siding forms corners or where it meets windows, doors or chimneys.

The existence of roosting bats in buildings is sometimes indicated by the presence of black or brown stains from body oils or droppings (guano) around cracks or crevices. Bat droppings may also appear on walls, under porches or decks, or beneath dilapidated ceilings. Bat guano may resemble small, hard rodent pellets; but it is soft, easily crushed to reveal shiny insect parts and does not contain any white material.

1.3 **Evicting bats from buildings**

Excluding bats from buildings requires establishing one-way exits through which the bats can leave but cannot return, while also sealing all other potential entry points. This process of eviction and exclusion is the only effective and permanent solution when bats in a building are unwanted.

Trapping and relocating is ineffective since bats have powerful homing instincts and will simply return, even when released at great distances. The use of pesticides against bats is illegal and counterproductive, and greatly increases the likelihood of bats coming into contact with people and pets.

1.4 **Preventing access**

Small bat colonies can usually be tolerated and simply left alone, but bats should always be prevented from entering human living quarters.

The first step in exclusions is to inspect the building's interior for small openings through which bats could enter. All openings connecting the attic or other potential roosting areas to living quarters should be sealed, while entry points on the outside of the building are left open. Caulking, flashing, screening or insulation can be used to seal most openings on the inside. Draft guards should be placed beneath doors to attics; electrical and plumbing holes should be filled with steel wool, caulking or weather stripping.

Caulking, flashing, screening or heavy-duty mesh can be used to bat-proof most openings on the outside. Expanding foam or similar products should never be used to seal cracks in a building where bats are active because they can become caught in it. Caulking should be water-based and applied early enough in the day so it has time to dry before bats emerge in the evening.

Never simply wait for bats to fly out at night and then seal openings. Not all of the bats leave at the same time, and some may remain inside all night, especially during storms. Instead, use tubes as one-way valves that allow bats to leave, but not to re-enter. These valves (or exclusion devices) must be placed over all openings that bats use to enter and exit. Valves may be constructed from well-cleaned caulk tubes or plastic pipes. These exclusion devices should be left in place for a minimum of seven nights and in some cases, two full weeks to ensure that all

bats have left the building. After careful observation to be sure all bats have left, the one-way valves may be removed and the openings sealed.

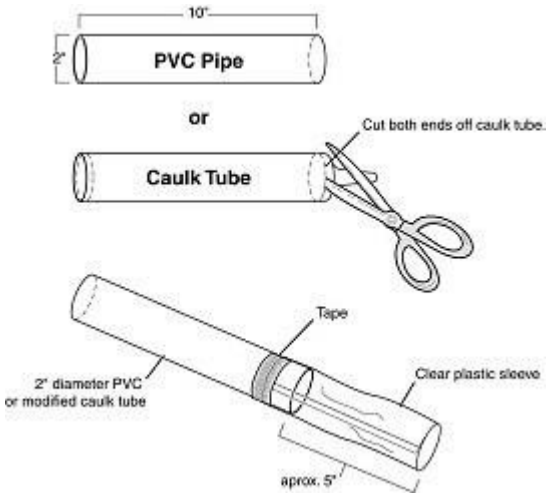
What about baby bats?
Bats often roost in buildings during maternity periods, when they give birth and raise their pups. Exclusions should not take place until young bats are able to fly; otherwise, they will be trapped inside, away from their mothers, and die of starvation. Separating pups from their mothers may also lead mother bats to search for other entrances to reach their young.

In North America, the maternity season begins as early as April. Young bats are flying by late August. Exclusions should not be conducted between April and September.

Most house-dwelling bats migrate to warmer climates or enter caves or abandoned mines to hibernate in the late fall. However, a few species can hibernate in buildings. If hibernating bats are present in cold regions during the winter, exclusions should be postponed until spring when they emerge to feed. In mild climates, some bats may remain active year-round, but exclusions should be carefully monitored or avoided during periods when night temperatures fall below 50 degrees F (10 degrees C).

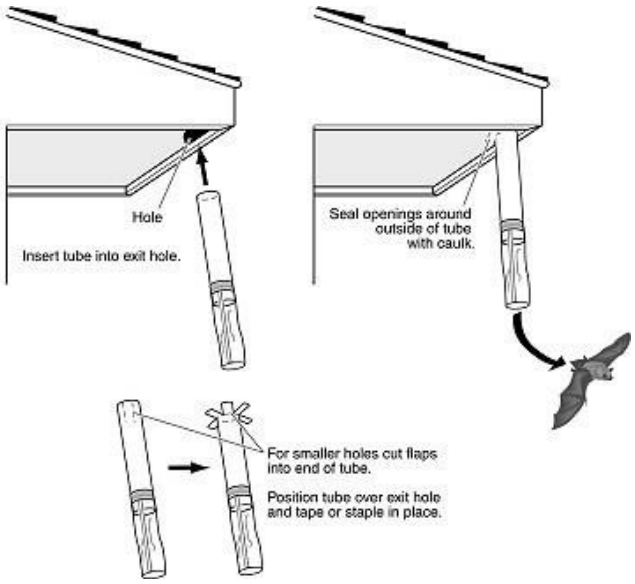
1.5 Excluding bats with tubes

In most cases, tubes make the best bat-exclusion devices. These include openings on buildings with rough exterior walls, such as brick or stone houses and log cabins. Tubes also work best for holes at corners where walls meet and on horizontal surfaces such as soffits.



Exclusion tubes should have a diameter of two inches (five centimeters) and be about 10 inches (25.4 centimeters) in length. Exclusion devices can be purchased commercially or made from PVC pipe or flexible plastic tubing. Bats are unable to cling to the smooth surface of these tubes, so the tube should project no more than one-quarter inch (six millimeters) into the opening. This will ensure exiting bats can easily enter the tube. Laura Finn of Fly By Night Inc., says empty caulking tubes also work well after caps at both ends have been cut away. Caulking tubes must be thoroughly cleaned before they can be used for exclusions because dried caulk forms a rough surface that could allow bats to reenter. These flexible, plastic tubes let you squeeze one end so it fits into a crevice. Or you can cut one end into flaps that fit over an opening and can be caulked, stapled, nailed or screwed into place (see diagram).

Once the tube has been secured over the hole, a piece of lightweight, clear plastic can be taped around the tube's outside end (see diagram) to further reduce the likelihood of bats reentering, though this is usually not necessary.

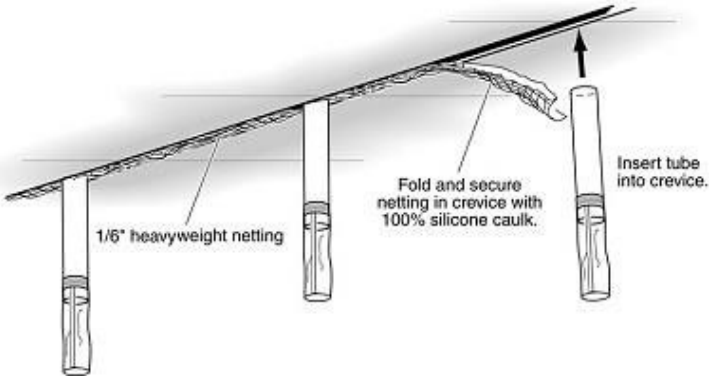


Plastic sleeves collapse on themselves, preventing bats from re-entering once they have crawled out through the tube. After the tube has been secured into or over an opening used by bats, any spaces between the outer rim of the tube and the building must be sealed shut. Also be sure to seal any other openings in the building that bats could use. Leave the tube in place for a minimum of seven days to ensure all bats have left. After the bats have been excluded, the tube should be removed and the opening permanently sealed with silicone caulking, caulk-backing rod, hardware cloth or heavy-duty plastic mesh. In some cases, sealing may require repair or replacement of old, deteriorated wood. When bats are using multiple openings to enter and exit, exclusion devices should be placed on each opening. If the bats do not appear to be exiting or seem to be having trouble doing so, add new valves as needed.

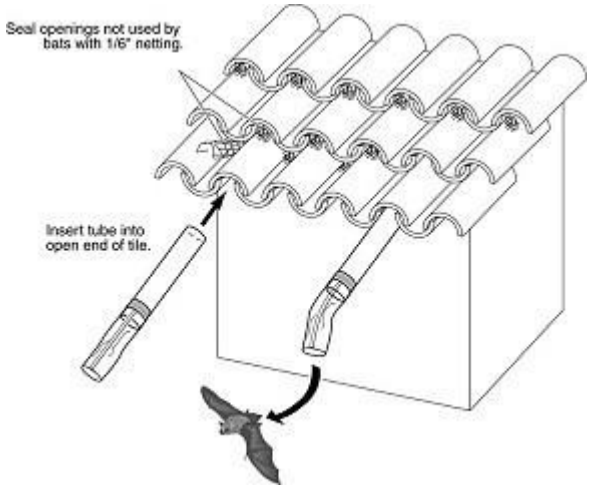
1.6 **Special situations**

Multiple exclusion tubes are often required to exclude bats from large structures or problem roofs.

When bats are roosting in long crevices, such as those found in some parking garages, exclusion tubes should be placed every few feet along the length of each crevice or in every discrete section to ensure all bats can easily exit through the valves. The spaces between the tubes should be bat-proofed with heavyweight mesh (see diagram). Fold the netting so it fits into the crevice and caulk it in place as shown. The same procedure can be used for crevices created where flashing has pulled away from a wall.

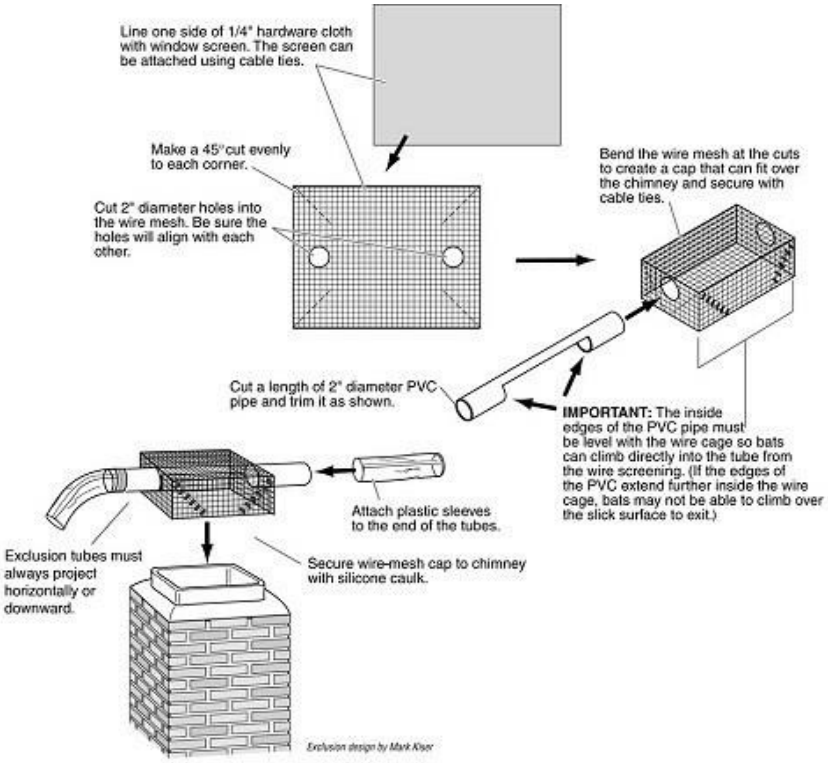


Plastic tubes also work well for excluding bats from under Spanish (clay) or concrete roofing tiles. Bats typically enter through open ends on the lowest row of tiles or through openings created where tiles overlap. Exclusion tubes should be placed at all active openings (see diagram). Collapsible plastic sleeves should also be attached to the ends of the tubes. Heavyweight plastic netting can be folded and inserted into spaces where tiles overlap (see diagram).



Bats may also enter a building through spaces beneath corrugated or galvanized roofing sheets. These roofs can be sealed with a variety of materials after bats have been excluded.

Special modifications may be needed when bats roost in chimneys or in spaces between a chimney and roof. If bats are roosting inside the chimney, build a wire cage from quarter-inch hardware cloth lined with window screen. A section of PVC pipe can be inserted through holes cut into the sides of the cage (see diagram). Although bats are able to drop down and out of a vertically placed tube that extends below the roost, they cannot grip the slick surface to crawl out if the tube extends upward above the roost.
Therefore, the tubes should project either horizontally or downward. A collapsible plastic sleeve should be placed over the ends of all horizontal tubes. Once the bats have been excluded, a chimney cap should be installed.



1.7 **Roosting on porches**

Bats sometimes roost briefly at night on porches or under overhangs while they digest insects they've eaten. These temporary roosts should usually be tolerated unless the bats are considered a nuisance. Mylar balloons, strips of aluminum foil or ribbons hung from the porch ceiling and allowed to move in the breeze may also discourage bats from roosting in that area.

1.8 **Installing a bat house**

When excluding bats from a building, it's important to provide bats with a new place to live. Visit the Bat House section of our website for free plans if you want to build your own bat house, or buy one from our list of certified bat house vendors.

1.9 **Guidelines for hiring a professional bat excluder**

Bat Conservation International promotes exclusion methods that ensure the safety of both bats and people.

Bat exclusion professionals should be licensed by the states in which they work, be insured and use only approved exclusion methods. They should also provide the property owner with a guarantee and list of references. All written materials should be accurate and scare tactics should be avoided.

One-way tube-type excluders are the preferred methods for evicting bats from buildings. Exclusion devices should be placed at all entry points and should remain in place for a minimum of seven days. These devices should be removed after all bats have been excluded, and exclusion points should then be sealed. BCI strongly recommends that exclusion professionals avoid spot treatments. Moving bats from one corner of a building to another does not solve the problem and may require further exclusions in the future.

Please note that simply waiting until the bats have flown out at night and then permanently sealing entrances without the use of exclusion devices is not approved by BCI. This method often traps some bats inside the building. BCI also discourages the use of "permanent netting" in most situations. For night roosts, we also recommend the use of Mylar balloons or strips of tin foil hung from roosting areas and allowed to move in the breeze.

Maternity season for bats in the US and Canada can range from April through August. Eviction of bats, or any activity that directly affects their roosting area, should occur only before or after the maternity season, when young will not be trapped inside.

Some bats hibernate in buildings during winter months. Winter exclusions should be performed only if it can be determined that no bats are hibernating in the building. If bats are present during the winter, exclusions should be postponed until spring temperatures are warm enough for deciduous plants to leaf out and insects to again be abundant.

Ultrasonic devices, chemical repellents and smoke are not approved by BCI.

Traps and relocation are not BCI-approved exclusion techniques; however it is acceptable to capture a single bat for species ID or to remove an individual bat from a living space.

1.10 **Bat roosting deterrents (to be employed only when bats are NOT present)**

- Mylar Balloons floating near the roost
- Strips of mylar material or even tin foil tacked up at the roost so they move in the breeze
- Curling ribbon (long pieces, curled and tacked at the roost)

- Vaseline (or some other slick substance that make gripping the roosting place difficult)
- Plastic taped over the roosting spot (to make it too slick for their feet to hold on and hang there)
- Bright lights and fans

These ideas are intended for night roosting bats (i.e., bats roosting under eaves of a roof or on a porch, etc., digesting the insects they have eaten), and the idea is for the bats to develop new habits. Day-roosting bats are typically in nooks, crannies, and crevices and must be properly excluded.

APPENDIX XII

PARKS CANADA NATIONAL BEST MAANAGEMENT PRACTICES
RPADWAY, HIGHWAY, PARKWAY AND RELATED INSTRASTRUCTURE

Parks Canada Parcs Canada

Parks Canada National Best Management Practices

Roadway, Highway, Parkway and Related Infrastructure

Canada

May 2015

Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure

Approved by

Original signed by Mike Wong

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Mike Wong, Executive Director Natural Resource Conservation Branch

Original signed by Kalvin Mercer

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Kalvin Mercer, Associate Vice-President Asset Management and Project Delivery

July 23, 2015

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Date

Contents

Introduction

The Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure will allow an identified suite of project activities to be undertaken in such a manner that there will not be resulting significant adverse environmental effects.

The Best Management Practice (BMP) pathway is applied when there is a suite of routine, repetitive projects (e.g. paving) or activities (e.g.de-watering), with well understood and predictable effects. This fulfils Park's Canada's obligations under the *Canadian Environmental Assessment Act 2012* as a manager of federal land, see the Guide to the Parks Canada EIA Process. The BMP maximizes efficiency through creation of a pre-approved impact assessment for the defined suite of projects, to which standard mitigation and environmental management measures can be applied.

The impact assessment officer (IAO) will review a proposed project and advise the functional manager of the project if and how this BMP should be applied. The IAO's advice will be based on whether the project falls within the scope of the BMP, and whether application of the mitigation measures in the BMP will adequately address potential adverse effects of the project.

Project Managers are responsible to ensure all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

The Impact Assessment Officers must ensure the project, EIA pathway applied and determination are recorded in the Parks Canada National Impact Environmental Assessment Tracking System.

Scope of Application

This BMP outlines the impact assessment of repetitive and routine projects on roadways, highways and parkways. If a project involves some or all of below activities, and the initial assessment of site and project indicate "the project is unlikely to result in significant adverse environmental effects" the BMP can be applied. Projects that this BMP would likely be applied to include:

- The proposed maintenance or repair of an **existing** sidewalk, or parking lot.
- The proposed maintenance or repair of an **existing** road, including pull-off areas, that would be carried out on the existing right of way[1].

Activities included in the scope of this BMP are:

1. Project Design
2. General Activities
    - Worksite Conditions/Staging/Laydown
    - Equipment operations
    - Fuel storage and refueling

[1] Highway Footprint or Right of Way (ROW): The permanent physical intrusion of a highway or freeway, including the road surface, shoulders, side slopes, drainage ditches and/or storm drainage ponds (Transport Canada, 2008).

- Site Clean Up/Waste Disposal

3. Asphalt Production and Handling
    - Asphalt Plant Operation
    - Gravel Crushing and Washing
    - Oiling of Truck Boxes
    - Clean Up and Disposal of Waste Products
4. Concrete Handling
    - Operation, maintenance and inspection of Onsite Temporary Concrete Washout Facility
    - Removal of Temporary Concrete Washout Facilities
    - Onsite concrete management
5. Paving, Resurfacing and Grading
    - Grading
    - Paving and Resurfacing
    - Pavement Marking and Barrier and Guardrail Reinstatement
6. Barriers and Guardrails
    - Repair, replacement and upgrades of barriers and guardrails
7. Vegetation Removal
    - Vegetation Removal
    - Grubbing
    - Brushing
    - Disposal of Vegetation Debris
    - Integrated Pest Management
8. Excavation, Soil Stripping and Overburden Removal
    - Excavation
    - Soil Stripping
    - Topsoil Salvage
    - Excavated Material Storage
    - Excess Material and Waste (overburden removal)
9. Slope Stabilization, Drilling and Blasting
    - Slope stabilization-scaling, hydraulic hammers
    - Drilling and blasting for Slope Stabilization and Geotechnical Investigations
10. Soil and Vegetation Restoration
    - Topsoil Replacement
    - Soil Amendments
    - Seedbed Preparation
    - Species Selection
    - Seed Lot Selection
    - Seed Mixture Composition
    - Seeding
    - Alternatives to Seeding
    - Reclamation Standards
    - Reclamation Plot Evaluation
    - Time Limits

10. Drainage Structures
    - Drainage structures
    - Culverts
11. Bridge Maintenance
    - Bridge Cleaning
    - Bridge Repairs Using Treated Wood Products
    - Bridge and Structure Painting
12. Water Withdrawal and Dewatering
    - Water Withdrawal
    - Pump Screens
    - Dewatering

Exceptions

This BMP is not suitable for the following project activities as they would require supplemental assessment and/or mitigations:

- Work that may impact aquatic or terrestrial wildlife habitat connectivity, such as fences or culverts;
- Elongation of culverts; realigning water courses; dredging; or work below the high water mark of a fish bearing water body;
- Bridge projects needing work to occur below the High-Water Mark[1], with permanent; alteration to the water course, such as replacement of piers/abutments or permanent installation of structures on the bed of a water body;
- Greater than 10% increase in land use footprint (e.g. gravel pit expansion); and,
- Work which might adversely impact any potential or established Aboriginal and Treaty rights or traditional use[2].

If the project has the potential to have an adverse effect on the critical habitat of a species at risk (with endangered, threatened, or extirpated status) this BMP does NOT apply. The project will require a separate environmental impact analysis.

If the project has the potential for **residual** adverse effects on a listed species at risk (including effects to individuals and residence of the individuals) this BMP does NOT apply, the project will require a separate environmental impact analysis.

Note: If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the National Office Species Conservation team.

[1] High-water Mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans, 2015). Upper Controlled Water Elevation (UCWE) is used as definition of High-water Mark in managed waterways.

[2] Parks Canada must engage in additional and separate consultations with Aboriginal groups if there is a possibility of a project adversely affecting established or potential Aboriginal or Treaty rights. This is required to fulfill federal government responsibilities in upholding the honour of the crown. If there is uncertainty regarding the need for Aboriginal consultation with respect to a project, refer the matter to Parks Canada Legal Services for advice. Guidance on consultation may be sought from the Aboriginal Affairs Secretariat and from the guidance document "A Handbook for Parks Canada Employees on Consultation with Aboriginal Peoples".

Approved geographic area of application

This BMP is intended for use in all Parks Canada administered protected heritage places with roadways, highways and parkways.

Components of the environment that may be affected

Potential effects from projects of this type are well understood and predictable. They include:

Water Resources:

- Adverse modifications to surface drainage patterns
- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)

Soil/Land Resources:

- Change in slopes, landforms, and landscape
- Soil compaction and rutting
- Slope instability, due to increased soil exposure and improper excavation and storage
- Soil contamination

Air quality:

- Decreased ambient air quality (i.e. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO2 and other pollutants
- Temporary increased localized temperatures from paving and equipment operation.

Flora and Fauna:

- Damage to and/or removal of vegetation in immediate or adjacent areas
- Introduction of non-native species populations, or expansion of existing populations
- Wildlife sensory disturbance causing displacement/preferred habitat avoidance
- Wildlife habituation/attraction to artificial food sources
- Impeded/altered wildlife movement
- Damage to nests/disruption of nesting animals
- Mortality from project activities

Cultural Resources:

- Adverse effects on the heritage value or character-defining elements of a cultural resource
- Impacts to archaeological resources (known or potential)

Mitigation Measures

To use the document efficiently, keep the activity mitigation lists that apply to the project expanded and collapse the other activities by clicking on the section titles, print this as a pdf or paper document and include with the EIA determination record. This will reduce the overall size and scope of the mitigations to present to contractors and project managers.

Choose all that apply to project. Each title is hyperlinked to the related section.

Module	
1.	Project Design
2.	General Activities
3.	Asphalt Production and Handling
4.	Concrete Handling
5.	Paving, Resurfacing, Grading
6.	Barriers and Guardrails
7.	Vegetation Removal
8.	Excavations, Soil Stripping and Overburden Removal
9.	Slope Stabilization, Drilling and Blasting
10.	Soil and Vegetation Restoration
11.	Drainage Structures
12.	Bridge Maintenance
13.	Water Withdrawal and Dewatering

1. Project Design

When upgrades to infrastructure are planned opportunities to decrease the environmental impacts of long term operation should be considered in the engineering design. Some examples are: directing runoff into vegetated areas rather than directly into surface waters to decrease pollution in surface waters, increasing the span length of bridges during replacements to allow for terrestrial wildlife passage underneath and converting smaller culverts to larger culverts or clear span bridges to allow for better fish passage and less restricted flows.

2. General Activities Mitigations Module

Construction activities involve the use of laydown/staging areas, equipment operations, storage and handling of hazardous materials. Potential adverse effects include: destruction of vegetation, erosion and sedimentation, constriction for wildlife movements and introduction/spread of non-native vegetation.

Work Site Conditions/Staging/Laydown

2.1. All employees must attend a briefing with an Impact Assessment Officer (IAO) or Surveillance Officer (SO) before beginning work at the site review and explain the mitigations that are conditions of the project approvals.

2.2. Minimize vegetation-clearing activities and ground disturbance by staging on existing hardened areas wherever possible.

2.3. Avoid or terminate activities on site that attract or disturb wildlife. Vacate the area and stay away from the immediate location if wildlife display aggressive behaviour or persistent intrusion.

2.4. Control materials that might attract wildlife (e.g. petroleum products, human food and garbage).

2.5. Notify the SO immediately about dens, litters, nests, carcasses (road kills), wildlife activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported to SO within 24 hours.

2.6. Delineate the work zone; clearly mark the limits to active construction and the access and egress locations.

2.7. When work involves the disturbance of soils or the use of erodible materials (e.g. sands, topsoil), prevent the transport of sediment by the installing of appropriate erosion and sediment control.

2.8. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken in proximity to watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events. All components require regular maintenance to ensure effectiveness.

Equipment Operations

2.9. Equipment movements and workers' private vehicles shall be restricted to the 'footprint' of the construction area.

2.10. Ensure machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, noxious weeds and soils from off-site.
2.11. Operate machinery on land above the high water mark, on ice, or in another manner that minimizes disturbance to the banks and bed of any water body.
2.12. Limit machinery crossing (fording) a stream or watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure in compliance with the *Fisheries Act*.
2.13. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
2.14. Use temporary crossing structures or other practices to cross streams or water bodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.

Fuel Storage and Refueling/Emergency Plans

2.15. A Spill Response Plan will be prepared and detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products in accordance with all applicable federal and provincial legislation. The Plan shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
2.16. Spill kits shall be provided at re-fuelling, lubrication, and repair locations that are capable of dealing with 110% of the largest potential spill and shall be maintained in good working order. Site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
2.17. If potentially hazardous materials (e.g. cement-based products, sealants or paints) are used on site ensure raw material, mixed compounds and wash water are not released to any watercourse or soils. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
2.18. Hazardous or toxic products shall be stored no closer than 100 metres from streams, wetlands, water bodies or waterways.
2.19. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The SO shall be notified immediately of any spill. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
2.20. The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the proponent. The site will be inspected to ensure completion to the expected standard and to the satisfaction of Parks Canada.

Site Clean Up/Waste Disposal

2.21. Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.

2.22. Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.
2.23. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Parks Canada protected heritage places. These wastes shall be contained and removed in a timely and approved manner and disposed at an appropriate waste landfill site located outside the Parks Canada protected heritage place. Construction waste storage containers, shall be emptied when 90% full. Waste containers will have lids, be wildlife proof if there attractants and waste loads shall be covered while being transported.
2.24. Sanitary facilities, such as a portable container toilet, shall be provided and maintained in a clean condition.

3. Asphalt Production and Handling Mitigations Module

Asphalt is a common building material for transportation infrastructure. Its production requires the use of gravel, water, and petroleum products, and associated project activities include transportation, storage and handling of these materials. Installation of asphalt plants is common within the larger parks where gravel extraction is undertaken.

Timing of Works

3.1. Asphalt works are preferably undertaken during periods of dry weather as this allows easier control of contaminated runoff and sediment.
3.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

Operation of Asphalt Plants

3.3. Asphalt plant operation must comply with all environmental pollution control regulations, including provincial regulations, and the plant operational plan.
3.4. Spoil piles and stock piles will be at least 30 meters from the edge of any water body.
3.5. There must be enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant.
3.6. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the SO) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
3.7. The proponent shall be responsible for the purchase and safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site.
3.8. Excess hot mix or reject new asphalt shall be temporarily in stored in the containment area sufficient to prevent runoff of petroleum into soils or surface waters as directed by

the SO, and removed from the Parks Canada protected heritage place, prior to project completion.

3.9. Every effort will be made to recycle waste asphalt, either as a base course, or by recycling waste asphalt through the asphalt plant according to engineering specifications.Old cured ground asphalt material shall be removed, recycled, or stored for future recycling at an approved operational gravel pit or asphalt plant site. Stockpiles must be further than 30 metres from any surface waters.

3.10. Remaining stockpiles will be removed or incorporated into reclamation plans for the gravel pits or asphalt plant sites.

3.11. Asphalt to be removed must be sampled and analyzed to determine possible lead contamination. Contaminated asphalt will be transported to an approved waste disposal facility. A receipt of delivery is to be provided to the SO.

3.12. Proponent should protect containment/catchment areas and drip trays at the asphalt plant from rainfall since, if contaminated, all of the collected water will require disposal of at an approved disposal facility at the expense of the Proponent.

3.13. Dyking and ponding will be required to control the rate and quality of runoff from the plant site.

3.14. Ensure that the water in the settling ponds remains clean of petroleum products. Any contaminated water will require disposal at an approved disposal facility at the expense of the Proponent.

Gravel Crushing and Washing

3.15. Where possible within engineering constraints, asphalt materials should be recycled to reduce the need for new gravel.

3.16. Gravel will be obtained from an approved operational borrow pit only. For gravel obtained from a borrow pit within a protected heritage place or borrow pit, gravel extraction within the footprint of the disturbed area of the approved operational borrow pit is permitted.

3.17. Gravel will not be crushed within 30 meters of any water body.

3.18. If water for cleaning is extracted from a watercourse, refer to water withdrawal section of this BMP.

3.19. If gravel requires washing, the water used will not be returned directly to any watercourse.

3.20. Water free from chemical contaminants will be discharged into ground where further erosion and runoff into surface water is prevented. Discharging into well vegetated ground surface, at a rate which prevents erosion can often provide increased absorption and reduction of sediment load.

3.21. Contaminated water must be treated to meet CCME guidelines or transported outside of the Parks Canada protected heritage place for disposal at an approved facility.

3.22. For waste removed from the park a detailed receipt of delivery to an approved facility will be provided to the SO.

Oiling of Truck Boxes

Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of thin fuel oil to prevent the mixture from adhering and causing waste asphalt.

3.23. Truck boxes may be oiled only when absolutely necessary.
3.24. Oiling will take place in a bermed area, consisting of a plastic underlay with 15 centimetres overlay of clean gravel. Oil contaminated gravel will be hand collected (so as to prevent tearing of the plastic) from the bermed area daily, and put through the asphalt plant.
3.25. Vehicle covers shall be securely fastened.

Air Quality Mitigations

3.26. Asphalt plants should be 500 meters from buildings with human habitation.
3.27. Emissions from the asphalt plant and paving project equipment will comply with End Product Specifications (EPS) emission control standards and other provincial emissions regulations. Stack test results provided to the ESO by the operator or surveillance contractor may be required when the asphalt plant is at full capacity to ensure the plant is operating within the required standards. If the plant is not operating within the appropriate levels, production will cease until the requirements are met.
3.28. Sludge removed from the clarifier that is free of chemical contamination will be contained to prevent fine dust particles from becoming airborne during windy periods.
3.29. Unannounced stack tests will be conducted throughout the project. If the plant does not meet requirements, operation will cease until the requirements can be met.

Disposal and Clean Up of Other Waste Products

3.30. To ensure regular clean-up of waste asphalt and petroleum spills, a defined clean up schedule will be established during the preconstruction meeting.
3.31. Leaks will be collected in drip-trays, the collected material will either be removed from the park, or recycled back through the Asphalt Plant. For any material removed outside the park to an approved facility, a detailed receipt will be provided to the ESO.
3.32. Used oil, filters, grease cartridges, oil cans and other waste products of plant servicing will be collected and disposed of at the nearest industrial waste facility.

4. Concrete Handling Mitigations Module

Concrete is a common construction material used in transportation infrastructure. Its use ensures longevity of the infrastructure and safety for public use. One litre of concrete wash water or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

Onsite Temporary Concrete Washout Facility

4.1. Temporary concrete washout facilities shall be located a minimum of 30m from storm drain inlets, open drainage facilities, and watercourses.
4.2. Temporary concrete washout facilities shall be temporary pit or bermed areas constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

4.3. Straw bales, wood stakes, and sandbag materials can be used to construct temporary containment walls or “barriers”.

4.4. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.

4.5. The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

4.6. Perform washout of concrete mixer trucks in designated areas only.

4.7. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.

4.8. Pump excess concrete in concrete pump bin back into concrete mixer truck.

4.9. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.

4.10. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per federal and provincial regulations.

Maintenance and Inspection of Temporary Concrete Washout Facilities

4.11. Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities.

4.12. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.

4.13. Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

4.14. Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sand bags, etc.).

4.15. Onsite concrete waste storage and disposal procedures should be monitored at least weekly or as directed by the ESO.

Removal of Temporary Concrete Washout Facilities

4.16. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and restored.

Onsite Concrete Management

4.17. Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Parks Canada Representative in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.

4.18. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
4.19. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.
4.20. Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative

5. Paving, Resurfacing, Grading Mitigations Module

Highway surface management activities are undertaken to ensure public safety on Parks Canada Agency highways by maintaining clean, level, and unbroken road surface conditions through activities such as pavement cleaning, patching, application of surface treatments, and pavement crack sealing. Grading is used to address drainage issues, vegetation encroachment, potholes and rough surfaces.

Timing of Works

5.1. Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of contaminated runoff and sediment.
5.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

Grading

5.3. During grade construction conducted close to any watercourse, water body or wetland ensure materials are not pushed, fall or are eroded into the water or wetlands.
5.4. No grade building shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
5.5. Materials shall be placed at storage sites or on the grade without spillage outside the work limits. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
5.6. Retain a 30 metre vegetated buffer around water bodies or install runoff management structures.
5.7. If possible grade roads early in the spring before vegetation develops seed heads or late in season after vegetation has set seed and is dormant to minimize non-native vegetation propagation.
5.8. Ensure gravel or road bed material is free of weeds and comes from an approved operational gravel source free of other contaminates.

Paving and Resurfacing

5.9. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.

5.10. Minimize application of seal coats in wet conditions. Attempt to apply only to dry surfaces and not prior to (within 24 hrs.) or during rainfall. If unforeseen rain arrives ensure runoff from recently seal coated surfaces are prevented from entering surface waters.

5.11. For asphalt handling and management see the Asphalt Mitigation Module of the BMP.

Pavement Marking and Barrier and Guardrail Reinstatement

5.12. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface water Pavement marking shall be undertaken pursuant to standard methods applied in National Parks for control of paint products, both in transport and handling. The Contractor shall present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. the satisfaction of the Parks Canada Representative.

5.13. Where concrete barriers or guard rails are temporarily removed, for highway improvements, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

6. Barriers and Guardrails Mitigations Module

Repair, installation and upgrade of barriers and guardrails involves laydown/staging areas, equipment operations, minor excavation (e.g., for barrier post holes) and use of concrete. Potential adverse effects include destruction of vegetation and erosion and sedimentation.

Timing of Works

6.1. Where excavation is required, schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

6.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Repairs, Replacement and Upgrades

6.3. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken within 100m of watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger.

6.4. Where use of concrete is required for guardrail post holes, Concrete Handling Mitigations apply.

6.5. If vegetation removal is required for barrier or guardrail works, Vegetation Removal Mitigations apply.

6.6. Where concrete barriers or guardrails are temporarily removed, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

7. Vegetation Removal Mitigations Module

Roadside vegetation management activities include mowing, brushing, and landscape maintenance activities undertaken to maintain clear sight lines for highway users, control noxious weeds, facilitate effective drainage, and reduce possible fire hazards. Mature timber may need to be removed for improving road alignments, improving sight linesor replacing or repairing associated infrastructure. Grubbing (stump and root removal) may be required to prepare the ground surface for other activities.

Timing Windows

7.1. Vegetation clearing can negatively impact nesting birds and/or bats in spring and summer. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within these times a qualified professional biologist/ecologist should further clarify the species presence and timing particular to the work site and any occupied bird nests, eggs, or nests of species protected under the Migratory Bird Convention Act (MBCA). See appendix on regulatory guidance for further detail on the MBCA and SARA.

7.2. If a nest is found during the pre-work surveys, the vegetated area will be left intact with a suitable sized buffer of shrubs/trees around it until the young have fledged and left the nest. Size of buffer species dependent, to be determined in consultation with professional biologist or park ecologist.

7.3. Grass mowing and trimming should not occur during peak spring or fall reptile/amphibian migrations and hatching. Consult a local biologist/ecologist for site and species specific timing windows.

Vegetation Removal Mitigations

7.4. Vegetation removal should be limited to the minimum Clear Zone Distance[1] dependent on type and size of road and maximum height needed to meet the road safety objectives.

7.5. Minimize full removal and retain vegetation when possible to reduce erosion.

7.6. Prior to the commencement of any vegetation removal, the worksite must be surveyed for species at risk. If species at risk are found, work must be stopped until site-specific mitigations to address potential adverse effects are developed.

7.7. Survey vegetation for non-native species, clear vegetation areas with non-native vegetation in spring and early summer to avoid further spread and development of the non-native seed bank.

7.8. Clearing activities shall be avoided during nesting seasons for birds, reptiles and amphibian species in the project area.

[1] A clear zone is an unobstructed, traversable roadside area designed to enable a driver to stop safely or regain control of a vehicle that has accidentally left the roadway. The selection and design of appropriate clear zone dimensions is project-specific and should be the responsibility of professionals trained in roadside design.

7.9. If wildlife is observed during work, if possible, give animals the opportunity to escape the work area to the surrounding forest or elsewhere to seek new shelter.
7.10. Avoid ground vegetation removal during dry, windy periods to prevent erosion of topsoil and reduction of air quality with dirt/dust.
7.11. Retain 30 metre vegetated buffer around water bodies, where disturbance is necessary and unavoidable restoration is required.
7.12. Debris will not be deposited in water bodies.
7.13. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible.
7.14. Logs and other salvage materials are to be conveyed to and placed at a storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways or water bodies.
7.15. During the grubbing component, stumps, roots, imbedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to a designated pit.
7.16. Where possible preserve identified wildlife trees by limbing or topping if they are not assessed as hazard trees.

Disposal of Vegetation Debris

7.17. All vegetation debris must be removed as soon as possible from the right-of-way, either by transporting off-site for disposal or piling and burning on-site.
7.18. All vegetation containing non-native species will be piled and burnt or bagged and removed off site to disposal facility.
7.19. Piles will be made where trees are felled, piles will be 1.2-1.8 (4 to 6 feet) in diameter and no more than 1.2 m (4 feet) high (approximately 1 to 3 trees per pile) or as instructed by local fire and vegetation specialists.
7.20. Piles are to be located so that they do not scorch surrounding live trees and measures must be in place to ensure that fires do not spread (i.e., conduct burning on snow or on mineral soil).
7.21. Piles will be left until fall for burning to allow for curing of green fuels.
7.22. Provincial regulations for air quality must be met.
7.23. Where fire fuel loading is not a concern vegetation debris of limited amounts will be dragged in the forest to mimic natural tree fall.
7.24. If removal or burning are not feasible a chipper may be used for less than 50 boles per hectare. Chip depth is to be a maximum of 5 cm (2 inches), spread over area no greater of 5m x 5m per hectare so as to not cover underlying vegetation, prevent new native seedlings from sprouting, and cause soil/seed bank sterilization. Spreading of chips may extend beyond these parameters with permission from Parks Canada.
7.25. To facilitate chipping of woody debris, all trees/shrubs/vines can be left temporarily along the road shoulders and laid facing the same direction.
7.26. In some cases, logs from newly cut trees may be set aside for use elsewhere as directed by local park site managers and the ESO.

7.27. Store removed vegetation on already disturbed areas to minimize disturbance area.
7.28. In appropriate areas re-establish native vegetation where it has been completely removed/damaged.

Integrated Pest Management

7.29. A Field Unit Integrated Pest Management Plan (IPMP) must be completed and approved prior to the use of herbicides to ensure the most effective and least harmful substances are properly used.

8. Excavations, Soil Stripping and Overburden Removal Mitigations Module

Construction projects often involve excavations. To successfully complete reclamation of disturbed areas, and protect areas from erosion proper soil handling and backfilling procedures must be followed. Post excavation and stripping soil and vegetation restoration mitigations should be applied. See section of this BMP for Soil and Vegetation Restoration.

Timing of Works

8.1. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
8.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Excavation

8.3. Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation.
8.4. All sediment control measures must be in place before starting work in the vicinity of rivers, water bodies, watercourses, and wetlands.
8.5. Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels.
8.6. Excavation plans must be compared to local archaeological resource inventories, if available. If no archaeological information is available for the work area, an Archaeological Overview Assessment (AOA) may be required to determine the archaeological potential of the work area. Based on the results from the AOA, an Archaeological Impact Assessment might be required. It would be time and cost efficient to refer the plan to Parks Canada's Terrestrial Archaeology section before conducting any excavation to determine the appropriate course of action.
8.7. If cultural resources (eg. archaeological resources) are discovered, immediately cease work, and alert SO.
8.8. Minimize changes to the ground surface that affects its infiltration and runoff characteristics and maintain/re-establish effective surface drainage on completion of the project

8.9. Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for re-vegetation.

8.10. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife entrapment.

Soil Stripping

8.11. Strip topsoil under dry conditions, whenever possible.

8.12. No stripping shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.

8.13. In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavourable for construction, heavy rain events, construction delays, etc.) erosion control of bared soils or excavated material stockpiles is required.

8.14. Stripping close to any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, do not fall or erode into the water or wetlands.

8.15. Work within a 100 metre buffer from the high water mark of waterways or wetlands will require a site specific sediment and erosion control plan.

8.16. An erosion control plan is also needed to control dust generated from the construction site.

Topsoil Salvage

8.17. Salvage topsoil at all excavation sites for reclamation purposes.

8.18. Usually the upper 15 cm of soil, below the sod layer if present, is considered topsoil, where depths exceed 15cm salvage the entire depth of topsoil.

8.19. Remove stumps and woody debris from topsoil, wherever possible.

Excavated Material Storage

8.20. Allow space for separate storage of topsoil and spoil; where space is available separate stored topsoil from spoil by at least 1 m. Use appropriate material (e.g., geo-textile) to separate soil components where space is limited.

8.21. Topsoil may be stored on hardened surfaces, geo-textile material or directly on undisturbed vegetation. If storage occurs on vegetation, material recovery by hand may be required.

8.22. Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events.

8.23. Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain.

8.24. Construct barricades to prevent losses on steep terrain (>18°, 3:1) and within 100m of watercourses.

Excess Materials and Waste (Overburden Removal)

8.25. Remove excess excavated material from site where it cannot be used for the final grading of the area. Site specific arrangements must be made for disposal locations and procedures of overburden.

8.26. Surplus excavated material may be used to fill depressions around the project site providing topsoil is stripped before filling, with approval from SO.

9. Slope Stabilization, Drilling and Blasting Mitigations Module

Where standard excavation is not sufficient, scaling, hydraulic hammers, drilling units or trim blasting are used to break up rock or soil for removal. Accumulations of debris in ditches reduce their effectiveness at trapping rock fall and reduce public safety. Ditches will be cleaned using a loader and back hoe. Guardrails and rock fences may be temporarily removed to permit this activity.

Timing of Works

9.1. Time any vegetation removal work should adhere to the Migratory Bird windows for the area.

9.2. Time work to reduce impact to mammals, amphibians and reptiles using rock faces during sensitive life stages such as birthing and rearing of young. This often occurs during the spring. Confirm timing windows with local wildlife ecologists.

9.3. Avoid ditch clearing during wet periods and wait until ditches are dry to reduce impacts to amphibians and reptiles and limit sedimentation.

Slope Stabilization-Scaling, Hydraulic Hammers

The use of hydraulic hammers attached to excavators is considered the ideal solution for rock disintegration. It avoids rock blasting where the parent rock is no longer rippable by the excavator's bucket but still has enough planes of weakness for economical operation and effective use of the hydraulic hammer. Scaling is the manual removal of loose material on rock slopes using pry bars, hydraulic press, brooms, shovels and power equipment operated by personnel using roped access to a rock face.

9.4. For vegetation clearing refer to the vegetation removal mitigation module of this BMP.

9.5. For slope-stabilization in soils, please refer to the Excavation section.

9.6. Survey the work site for cultural resources such as rock art (ex. pictographs, petroglyphs, etc. prior to the work commencing, establish site specific mitigations for their protection.

9.7. Measures shall be taken to control dust as much as possible during the removal and falling of rock materials down slope.

9.8. Placement of rip rap and backfill on shorelines shall be undertaken without contacting the watercourse, wetted margins and must not be below the High Water Mark.

9.9. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately- sized, clean rock is used, and rock is installed at a similar slope to maintain a uniform bank.

9.10. Direct concentrated surface water (runoff) away from cut and fill slopes.

9.11. Immediately stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through vegetation restoration with native species suitable for the site-refer to soil and vegetation restoration section of BMP.

Drilling and Blasting for Slope Stabilization and Geotechnical Investigations

Trim blasting is used for controlled blasts in which explosive charges are placed in predetermined pattern of holes drilled into the rock face and then detonated. Potentially unstable masses of rock can sometimes be stabilized using rock bolts and long steel rods drilled into the rock to bind it together. Drilling is a common method of investigation to obtain geotechnical reports required for engineering design.

Drilling

9.12. Debris from drilling will be contained (screened or settle out) so it will not cover the surrounding area or enter any water course. All debris will be removed, see section on overburden removal for further mitigations.

9.13. The cuttings from all drilling will be contained so they can be removed entirely from the site. If contaminated, the cuttings are to be disposed at an approved waste disposal facility.

9.14. Control of spoil and sediment loaded water is required on the drill site. Dyking will be required to retain the deposit on non-vegetated surfaces. If contaminated, the spoil pile must be disposed at an approved waste disposal facility.

9.15. During aquifer tests, the water must be piped so it does not erode any soil or any part of the ground. If the water from the tests is piped to a creek, stream, or river, the pipe is to be situated so that there is no erosion of the stream bank or bed. If any sand or similar material is discharged during the aquifer test, care must be taken that the sand does not cover any vegetation.

9.16. All test wells will be filled in after the testing is completed. The proponent will be responsible for rectifying any future problems associated with any of the wells or test wells.

Blasting

9.17. The Parks Canada Representative will identify a magazine location for explosives should a factory site or "ready-to-use" explosives storage site be required

9.18. The blasting supervisor will ensure no damage to infrastructure, people, surrounding vegetation or wildlife by mitigating risk of fly rock.

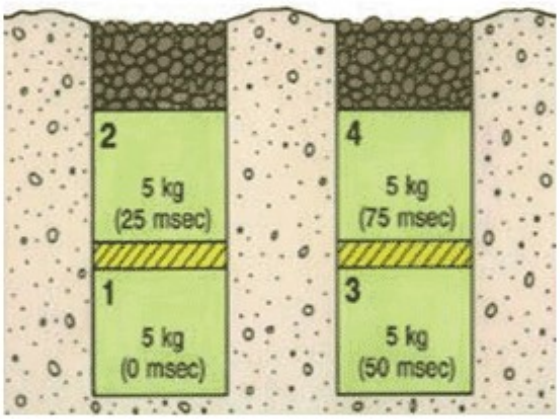
9.19. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

9.20. If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a bridge or culvert), the potential for impacts to fish and fish habitat will be minimized by implementing the following measures:

- Time in water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries **timing windows**.

- Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
- Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting.
- Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e. Decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).
- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products. Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: Sample Blasting Arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes and decking of charges within holes. (Fisheries and Oceans Canada, 2015)

10. Soil and Vegetation Restoration Mitigations Module

Almost all projects activities included in this BMP will require some ecological restoration- *the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed*. The restoration plan can be a simple application of the following mitigations and can be at the site or both at the site and in concert with another site designated to offset the permanent impact of a project. For disturbance areas greater than a hectare a restoration plan is required. The restoration works can be often be considered projects in and of themselves. Soil and vegetation restoration must apply the principles of effective, efficient and engaging solutions.

Timing Windows

10.1. Develop restoration plan as part of the project scoping and specifications prior to project approvals.

10.2. Vegetation restoration is most effective if seeded in the fall, this allows for full scarification of the seed over the winter and adequate moisture available. Spring and early summer will also work, consider using seed that requires shorter scarification times for these applications. Transplants will do best in the spring and summer and will require adequate watering.

Topsoil Replacement

10.3. Implement restoration plan for the disturbed area immediately following completion of construction.

10.4. Replace topsoil to all areas immediately following fine grading.

10.5. Do not compact topsoil.

10.6. Where insufficient topsoil is available imported soil may be used as a last resort. Imported topsoil must be certified completely free of non-native seeds and compost developed from sewage treatment plants. Methods of improving vegetation succession using locally sourced, weed and contaminant free materials are preferred.

10.7. Slopes to be seeded should be no steeper than 2 horizontal to 1 vertical (2:1) and covered with a minimum of 5 cm (2 inch) of topsoil. Finish grading should always follow top soil placement.

10.8. Where remaining soils are unstable due to steepness or soil characteristics, immediate installation of sod or erosion control blanket is required.

10.9. Methods of bioengineering such as terracing, willow staking, live pole drain systems should be assessed as solutions where soils are steeper or remain unstable.

Soil Amendments

Fertilizer Application

10.10. Avoid use of fertilizer to limit non-native vegetation growth and allow for local species to use available nutrients.

10.11. If needed use locally sourced mycorrhizae compost teas to improve vegetative success.

Topsoil substitute

10.12. Apply an organic cellulose only amendment as a soil substitute if reclamation standards are not being met within the defined time frame.

10.13. Determine the type of organic amendment based on the site-specific requirements (e.g., peat moss, compost).

Seedbed Preparation

10.14. The seedbed will be scarified by hand or, with the approval of the SO, by machine on large areas (i.e., roadbeds) where it is accessible and appropriate.

10.15. The seedbed will be scarified if seeding takes place more than 7 days after final grading or if there has been a rainfall between final grading and the seeding date.

10.16. The cleats of a tracked vehicle or a harrow device will be used, where possible, to prepare an adequate seedbed with seedling safe-sites (microsites) substantially free of soil crusts.

10.17. Align cleat marks at right angles on slopes to trap seed and sediment and reduce erosion.

Species Selection

10.18. When selecting species and varieties:

- Use species of local native plant communities.
- Species viability in proposed environment and climatic conditions.
- Capability to effectively control erosion, where required.
- Adaptation to the variable site conditions of undulating topography.
- Consider palatability of some species to herbivores and avoid growing attractants in areas of increased risk to wildlife and visitors.
- Variable life expectancy to produce variable, delayed die-out of seeded species and replacement with indigenous native plants.

Seed Lot Selection

10.19. Select seed lots based on indigenous species variety and quality (guaranteed weed seed free content and highest purity and germination), consult with vegetation restoration specialist or fire/vegetation ecologist.

10.20. Reject any seed lots containing any seed of undesirable crop or weed species.

Seed Mixture Composition

10.21. The proportion of each species should be calculated to provide an adequate quantity of pure live seed (PLS) per unit area of each key component.

10.22. Aim for density of about 140 seedlings/m^2 at the end of the first growing season to provide adequate ground cover and allow native species to re-colonize the site over time.

10.23. Consider that parameters such as seed lot purity, seed germination, seedling establishment, seed size and seeding method affect the final stand composition.

Seeding

10.24. Use approved native seed mixes developed for site-specific conditions for various elevations.

10.25. Seed and stabilize (e.g. mulch/tackifier) bare areas as soon as possible after disturbance, preferably as soon as a significant area is graded and finished and before the next rain event. If there is a risk of seedling mortality as a result of fall frost stabilize until appropriate growing conditions exist.

10.26. Use sod in high traffic areas or places that need extra erosion control. Source sod grown from native species (often called fescue sod) and ensure adequate anchoring and watering is in place.

10.27. Use temporary seeding when outside the seeding dates for permanent vegetation

10.28. Apply a seed mixture which is appropriate for the climate, soil, and drainage conditions of the site.

10.29. Apply seed at a rate appropriate to the seed mixture, seeding method and existing vegetation conditions.

10.30. Conduct broadcast seeding under calm wind conditions. Hydro-seeding is acceptable where access is available.

10.31. Do not exceed 30 kg/ha for the broadcast method, ensure seed is integrated with the soil by light rake or harrow. Broadcast method seeding rate is 25 kg/ha (2.5g/m^2) (e.g., 1x25 kg bag will cover 10,000m^2 or 1 hectare).

10.32. For hydro-seeding do not exceed 75 kg/ha with light mulch rates (500 kg/ha- of mulch with hydro-seeding) and 150 kg/ha with heavy mulch rates (1500 kg/ha of mulch with hydro-seeding).

10.33. Do not increase the seeding rate to compensate for poor seedbed conditions.

10.34. Monitor temporary erosion control measures to prevent seed loss.

10.35. Some seeding procedures may have to be completed or repeated in subsequent years.

Alternatives to Seeding

10.36. Use topsoil seed bank in small areas when there is no risk of erosion or competition from invasive species (i.e., natural regeneration).

10.37. Use native transplants in areas where conventional seeding applications are not applicable or where slope stability is an issue.

10.38. Use conventional forestry planting methods for container grown transplants, see website for guidance.

Reclamation Standards

10.39. Minimum standard for plant density is 25 plants/m^2, with 90% frequency.

10.40. Minimum standard for plant cover is 80% ground cover, with 90% frequency.

10.41. Minimum standard for plant community composition standard is 50% cover and 90% frequency of native species.

10.42. Exclude species designated as weeds in the work sites from the plant density standard consult local vegetation ecologist for current site specific non-native vegetation management program.

10.43. Rock, plant litter and non-vascular species are included in the cover standard.
10.44. Remaining plant cover of seeded native species is acceptable.

Reclamation Plot Evaluation

10.45. Select any site within reclamation area measuring 10 x 10 m, providing 100 plots of 1 square meter.
10.46. Measure the plant density, cover and composition in each of the 100 square meter plots.
10.47. The reclamation standard will have been met if 90 of the 100 plots match or exceed the criteria.
10.48. No fertilizer will be applied one year before the reclamation standard is evaluated.

Time Limits

10.49. Inspect site annually during the growing season.
10.50. Minimum reclamation standard, as above, to be met within one season post planting.
10.51. Apply amendments annually, depending on reclamation progress.
10.52. Re-seed site if the plant density standard is not expected to be achievable within 5 years.

- A new restoration plan will be prepared and implemented when reclamation standards have not been met after 5 years.

11. Drainage Structures Mitigations Module

Drainage structures on roadway, highway and parkways are structures such as culverts, ditches and drains. Drainage structure management activities are undertaken to ensure that surfaces are safe and efficiently drained, water is efficiently channeled to ditches and watercourses, and erosion of highways and adjacent properties is prevented. These mitigations include the cleaning and maintenance of drainage structures and related hardware, as well as the repair or replacement of existing and installation of new drainage structures.

Timing of Works

11.1. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics specialists and DFO offices for further information on **timing windows** in your region.
11.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
11.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
11.4. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Drainage Structures

11.5. Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.

11.6. Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth-moving equipment.

11.7. For smaller scale debris and sediment removal activities, remove materials by hand.

11.8. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact on channel banks surrounding your work area.

11.9. Ensure any works to repair damaged structures retain the pre-repair channel conditions (e.g., streambed profile, substrate, channel cross section) and do not constrict the stream width.

11.10. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Culverts

If a proposed culvert crosses a stream where fish are present, the crossing should be designed or upgraded to provide fish passage and avoid interference with fish habitat. To mitigate the impact of culverts on fish movement technical assessment of the water flows and fish species is required to establish a culvert design that will allow for passage of fish. Often there are regional or provincial best practices available online and qualified professionals can assist with designs. Some best management practices for installation or replacement of culverts follows.

Culvert Design and Alternatives

Utilize alternative crossing structures (e.g. clear span bridges, lock blocks and concrete decks) as a replacement for culverts, where possible.

11.11. Ideally, crossings should have natural streambed material through them to allow continuous substrate that matches the streambed below and above the crossing. Open bottom crossings are ideal for maintaining natural substrate.

11.12. Utilize a single large culvert design over a multiple culverts design (i.e. several smaller culverts) to reduce debris blockage and increased fish and wildlife passage, where hydrologically feasible

11.13. Design culvert bottoms to be placed at least 30cm below the stream bed elevation to ensure culverts remain passable by fish and wildlife by preventing culverts from becoming perched.

11.14. A minimum water depth of 200 mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool can be constructed. In some cases, an upstream pool may also be necessary.

11.15. The culvert slope should follow the existing streambed slope where possible.

11.16. The culvert, inlet(s) and outlet(s) should be adequately protected with rip-rap to prevent erosion and scour around the culvert during high runoff events. The following measures should be incorporated when using replacement rock to stabilize the culvert:

- Place appropriately-sized, clean rocks into the eroding bank area by hand or machinery operating outside the water course.
- Do not obtain rocks from below the ordinary high water mark of any water body.
- Where possible, install rock at a slope similar to the stream bank to maintain a uniform stream profile and natural stream alignment. Otherwise, install the rock at the closest slope required to ensure it is stable.
- Ensure rock does not interfere with fish passage or constrict the channel width.

11.17. Trash racks should not be used near the culvert inlet. Accumulated debris may lead to severely restricted fish passage and potential injuries to fish. Where trash racks cannot be avoided in culvert installations, they must only be installed above the water surface indicated by bank full flow. A minimum of 9 inches clear spacing should be provided between trash rack vertical members. If trash racks are used, a long term maintenance plan must be provided along with the design, to allow for timely clearing of debris.

11.18. Natural or artificial supplemental lighting should be considered in new or replacement culverts that are over 150 feet in length.

11.19. Ensure designs locate culvert structures in areas that minimize impacts to riparian vegetation and associated wildlife.

Culvert Installation

11.20. It may be necessary to exclude fish from the immediate construction site while a culvert is being installed. If this practice is necessary, fish shall be salvaged by a qualified aquatics professional from within the exclusion area.

11.21. If dewatering is required refer to the dewatering mitigation module of this BMP for appropriate mitigations.

11.22. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

11.23. Remove any old structures to a suitable upland disposal facility away from the riparian area and floodplain to avoid waste material from re-entering the watercourse

Wildlife Considerations for Culverts

At times, culverts are placed along portions of highways that bisect wetlands or specific habitats that support an abundance of wildlife. Consider building natural rock ledges through culverts to allow for small and medium-sized animals to walk on during periods of high flow.

12. Bridge Maintenance Mitigations Module

Bridge structure management activities include the cleaning and painting of bridge structures as well as the repair, rehabilitation, and replacement of bridge elements including decks, railings, abutments, and bearings. Works may include asphalt, concrete works, chipping, painting, grouting, timber truss, abutment and piling maintenance. These activities help ensure bridge structures remain structurally sound and safe for public use.

Timing of Works

12.1. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics

ecologists, provincial jurisdictions and DFO offices for further information on **timing windows** in your region.

12.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.

12.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

12.4. Cover or otherwise contain stockpiled materials during heavy rain events or extended absences.

12.5. If the work schedule requires working in the rain, the area of work must be isolated with appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Bridge Cleaning

12.6. Schedule bridge-cleaning activities to coincide with the watercourse's spring freshet when possible. At freshet or during periods of high flow a large watercourse will often have its highest background levels of sediment. At this time, the introduction of a small amount of sediment to a watercourse (from bridge cleaning) will have a lower risk of potential impact when considered against those high natural background levels.

12.7. If works are planned outside the freshet or if your region does not experience a freshet, discuss the protocol and timing of these works with your local aquatics ecologist and/or DFO Officer.

12.8. Dry sweep and collect loose material off bridge surfaces before washing the bridge. Adequately seal drains and any open joints on the bridge deck before sweeping or washing to prevent material or sediment-laden wash water from entering any watercourse

12.9. If dry sweeping and preventing direct runoff to waterway is not a feasible way to clean the surface, discussion and planning with local aquatic ecologists will be required.

12.10. Use water alone. If your cleaning activities require degreasers or any other chemical, approval for use must be obtained from local aquatics specialists and/or DFO.

12.11. Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the watercourse, then to a vegetated area or contained settling area (e.g., dry ditch channel unconnected to a watercourse) where it can infiltrate.

12.12. If superstructure cleaning is undertaken above or on the bridge deck level, prevent potentially harmful materials from entering into road drains. Block deck drains with suitable barriers (e.g., polyethylene or drain blocks) to prevent direct discharge to a watercourse, or re-route runoff through temporary piping onto adjacent settling pond or structure, using a hydro vacuum would be another option.

12.13. If water for cleaning is extracted from a watercourse, refer to water withdrawal section of this BMP.

Repairs Using Treated Wood Products

12.14. Untreated wood products are recommended, if treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Refer to the *Parks Canada Guide for the Use, Handling and Disposal of Pressure Treated Wood 2009* and any further updates from Parks Canada Real Property – Environmental Management.

12.15. If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Sawdust from treated wood is harmful to aquatic organisms and must be prevented from entering any watercourse.

12.16. Wood preservatives should be applied in a contained area and not be applied over or within 200m of water.

Bridge and Structure Painting

12.17. Ensure paint flakes, abrasive grits and abrasive/paint flake mixtures do not enter the watercourse as they may leach toxic heavy metals into receiving waters and/or be ingested by fish.

12.18. Install ground covers and/or vertical drapes such as sheets of plastic or air-permeable cloth (e.g., burlap or canvas) prior to removal activities to capture falling debris. Floating barges may be deployed in watercourses to capture falling debris, such as paint flakes and dust.

12.19. Waste materials collected during removal and application of protective coating operations (e.g., blasting abrasives, paint particles, rust and grease) should be collected and retained for disposal at appropriate locations. Waste materials must not be deposited into watercourses or riparian areas.

12.20. Use hydro blasting or manual techniques, where possible, when removing road dirt, soluble salts and loose paint to minimize impacts to the watercourse.

12.21. Use water without cleaning agent additives if grease film removal is necessary.

12.22. Avoid use of toxic liquid paints, primers, solvents, degreasers and rust inhibitors.

12.23. Minimize spill potential by storing, mixing and transferring paints and solvents on land.

13. Water Withdrawal and Dewatering Mitigations Module

Construction often requires the use of water, many common methods of excavation and site isolation require dewatering. Temporary, short term water withdrawal provides an efficient uncontaminated water source for local project sites. Dewatering can allow sites to be effectively dry during construction, reducing the impact of sediment laden water entering fish bearing waters.

Timing Windows

13.1. As a general guide to prevent taking more water than aquatic system can support, limit total take of water to less than 5 successive days and less than 10 days in any period of 30 days.

13.2. Avoid water withdrawal during breeding seasons of amphibians and reptiles to avoid destruction of egg masses, consult local aquatics ecologist for site specific guidance.

Water Withdrawal

13.3. Water should not be withdrawn from a wetland or stream less than 5 metres wide at the surface or a lake less than one hectare in area.

13.4. Water withdrawal should follow the 10/90 rule which allows for up to 10% of the stream flow to be withdrawn, as long as the stream flow does not fall below the 90% exceedence flow (eg.1 in 10 chance in a given year).

13.5. No permanent or semi-permanent works for water withdrawal should be placed in the stream channel.

13.6. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish, amphibians and/or reptiles. Entrainment occurs when a fish or amphibian is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish, reptile or amphibian is held in contact with the intake screen and is unable to free itself.

Pump Screens

13.7. In freshwater, fish-bearing waters design and installation of intake end-of-pipe fish screens:

- Locate screen in areas and depths of water with low concentrations of fish throughout the year away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
- Orient the screen face in the same direction as the flow of water.
- Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.
- Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
- Provide structural support to the screen panels to prevent sagging and collapse of the screen. Large cylindrical and box type screens should have a manifold installed to ensure even water velocity distribution across the screen surface. The end of the structure should be made of solid materials and the end of the manifold capped.
- Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where debris loading (woody material, leaves, algae mats, etc.) is a concern. A 150 mm (6 in.) spacing between bars is typical.
- Provision should be made for the removal, inspection, and cleaning of screens.
- Ensure regular maintenance and repair of cleaning apparatus, seals, and screens to prevent debris fouling and impingement of fish.
- Pumps must be shut down when fish screens are removed for inspection and cleaning.

Dewatering

13.8. A site specific dewatering plan is required be provided before commencing a pump-out sump to dewater excavation sites with specific details on how and where the water will be discharge.

13.9. Site specific mitigations may be required depending on the conditions of the discharge area, freezing conditions operation, overflow avoidance, decanting and settlement pond reclamation.

13.10. Water containing suspended materials shall not be pumped into watercourses, drainage systems or on to land, except with the permission of the SO.

13.11. Soil and vegetation erosion protection is required for water pumped on to land.

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Appendix 1 Regulatory Guidance

Jurisdictions

While all projects on lands managed by Parks Canada must adhere to Federal law and regulation, it is considered best practice to refer to local community, regional, provincial regulation and best practices where federal guidance is silent and/or attempt to meet those targets if it can reduce the overall impact of the project.

Some of the project activities reviewed have potential environmental impacts that are addressed by various provincial, federal and territorial acts and regulations. All activities must meet current environmental law and regulations in their design and construction. The following is a brief description of some of the key federal acts and regulations. Further review, understanding and application of other federal, provincial and territorial environmental laws are part of a rigorous approach to project planning and execution.

Canada National Parks Act and Regulations-Parks Canada

All work inside National Parks and Protected Areas must be performed in accordance with the laws and regulations set out in the *Canada National Parks Act* and Regulations. This includes the requirement for most activities described to only be done under a permit such as: business licence for contractor, disturbance of natural objects, travel in restricted areas, special events or use of disposal sites.

Fisheries Act - Fisheries and Oceans Canada

If a project is to be conducted near water, it is the proponent's responsibility to ensure they avoid causing serious harm to fish in compliance with the *Fisheries Act*. The advice in on the Fisheries and Oceans website will help a proponent avoid causing harm and comply with the Act.

If the water body in the project area has fish or is connected to waters at any time that have fish the project must meet the self assessment criteria on the Fisheries and Oceans website, if not a project review can be made by Fisheries and Oceans Canada to assess whether the project requires authorization or authorization can be requested directly. Given the level of detail required for a review and/or authorization request the EIA officer may need to consider a more involved EIA pathway in those circumstances.

Migratory Bird Convention Act – Environment Canada

The purpose of this Act is to implement the Convention by protecting and conserving migratory birds - as populations and individual birds - and their nests. Section 6 - prohibits the disturbance, destruction, or taking of a nest, egg, or nest shelter of a migratory bird.

In Canada, the general nesting period may start as early as mid-March and may extend until end of August. This is a general nesting period that covers most federally protected migratory bird species. This period varies regionally across Canada mainly due to differences in species assemblages, climate, elevation and habitat type. Generally, the nesting period is delayed in more northerly latitudes, corresponding to vegetation development and food availability. (Environment Canada, 2014). To help

with determining regionally relevant periods where nesting is likely to occur, Environment Canada is publishing estimated regional nesting periods within large geographical areas across Canada referred as "nesting zones". These periods are estimated for each zone and consider the time of first egg-laying until the young have naturally left the vicinity of the nest. Field Units may wish to refine this section and add their known local nesting periods.

Species at Risk Act

If a species listed under the *Species at Risk Act* (SARA) is found within the project area, any potential adverse effects from the proposed project to the individuals of the species, their residences and/or their critical habitat must be understood. Species at risk considerations require specific expertise, due to additional legal requirements under the SARA and CEAA 2012. If the projects or activities to be addressed by the BMP could affect a listed species or its critical habitat, the EIA officer may need to consider a more involved EIA pathway in those circumstances.