

Project Number: 5P468-21-0054

Lower Fort Garry National Historic Site,
5925 Highway 9, St. Andrews, Manitoba

Rehabilitation from Water Damage – Lower
Fort Garry National Historic Site

Fire Protection Tender Ready
Resubmission Specifications

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Part 1 General

1.1 Mechanical Engineer

- .1
- .2
- .3

1.2 Electrical Engineer

- .1
- .2
- .3

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 List of Drawings

- .1 Demolition
 - .1 D1.1 BIG HOUSE - MECHANICAL DEMOLITION PLAN - BASEMENT FLOOR
 - D1.2 BIG HOUSE - MECHANICAL DEMOLITION PLAN - MAIN FLOOR
 - D1.3 BIG HOUSE - MECHANICAL DEMOLITION PLAN - ATTIC LEVEL
 - D1.4 BIG HOUSE - ELECTRICAL DEMOLITION PLAN - BASEMENT FLOOR
 - D1.5 BIG HOUSE - ELECTRICAL DEMOLITION PLAN - MAIN FLOOR
 - D1.6 BIG HOUSE - ELECTRICAL DEMOLITION PLAN - ATTIC LEVEL
 - D2.1 MEN'S HOUSE - MECHANICAL DEMOLITION PLAN - MAIN FLOOR
 - D2.2 MEN'S HOUSE - MECHANICAL DEMOLITION PLAN - ATTIC LEVEL
 - D2.3 MEN'S HOUSE - ELECTRICAL DEMOLITION PLAN - MAIN FLOOR
 - D2.4 MEN'S HOUSE - ELECTRICAL DEMOLITION PLAN - ATTIC LEVEL
 - D3.1 FUR LOFT - MECHANICAL DEMOLITION PLAN - BASEMENT FLOOR
 - D3.2 FUR LOFT - MECHANICAL DEMOLITION PLAN - MAIN FLOOR
 - D3.3 FUR LOFT - ELECTRICAL DEMOLITION PLAN - BASEMENT FLOOR
 - D3.4 FUR LOFT - ELECTRICAL DEMOLITION PLAN - MAIN FLOOR
 - D3.5 FUR LOFT - ELECTRICAL DEMOLITION PLAN - SECOND FLOOR
 - D3.6 FUR LOFT - ELECTRICAL DEMOLITION PLAN - ATTIC LEVEL
- .2 Mechanical
 - .1 M1.1 BIG HOUSE FIRE PROTECTION PLAN - BASEMENT FLOOR
 - M1.2 BIG HOUSE FIRE PROTECTION PLAN - MAIN FLOOR
 - M1.3 BIG HOUSE FIRE PROTECTION PLAN - ATTIC LEVEL
 - M2.1 MEN'S HOUSE FIRE PROTECTION PLAN - MAIN FLOOR
 - M2.2 MEN'S HOUSE FIRE PROTECTION PLAN - ATTIC LEVEL
 - M3.1 FUR LOFT FIRE PROTECTION PLAN - BASEMENT FLOOR
 - M3.2 FUR LOFT FIRE PROTECTION PLAN - MAIN FLOOR
 - M3.3 FUR LOFT FIRE PROTECTION PLAN - SECOND FLOOR
 - M3.4 FUR LOFT FIRE PROTECTION PLAN - ATTIC LEVEL
 - M4 PROPOSED - TYPICAL NITROGEN GENERATOR SYSTEM SCHEMATIC
- .3 Electrical
 - .1 E1.1 BIG HOUSE FIRE ALARM SYSTEM PLAN - BASEMENT FLOOR
 - E1.2 BIG HOUSE FIRE ALARM SYSTEM PLAN - MAIN FLOOR
 - E1.3 BIG HOUSE FIRE ALARM SYSTEM PLAN - ATTIC LEVEL
 - E2.1 MEN'S HOUSE FIRE ALARM & SERVICE SYSTEM PLAN - MAIN FLOOR
 - E2.2 MEN'S HOUSE FIRE ALARM SYSTEM PLAN - ATTIC LEVEL
 - E3.1 FUR LOFT FIRE ALARM SYSTEM PLAN - BASEMENT FLOOR
 - E3.2 FUR LOFT FIRE ALARM SYSTEM PLAN - MAIN FLOOR
 - E3.3 FUR LOFT FIRE ALARM SYSTEM PLAN - SECOND FLOOR
 - E3.4 FUR LOFT FIRE ALARM SYSTEM PLAN - ATTIC LEVEL
 - E3.5 FIRE ALARM SYSTEM SCHEMATICS

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 Work covered by contract documents

- .1 Work of this Contract comprises of changes to the sprinkler system in the "Big House", "Men's House" and the "Furloft" buildings within Lower Fort Garry National Historic Site, located at 5925 Hwy 9 St. Andrews, Manitoba. For the purpose of this contract the owner will be represented by the Project Manager appointed by Parks Canada who will fulfil the role defined for the Departmental Representative in these specifications.
- .2 Work under this Contract covers supply of all labour, materials, and equipment required to carry out Inspection, Testing Maintenance activities of the electrical infrastructure and Construction in accordance with the contract documents. Work includes but is not limited to:
 - .1 Adjusting the hangers of the sprinkler system to adjust pipe slope as per drawings.
 - .2 Replacing dry pendent sprinkler barrel lengths.
 - .3 Reconfiguring existing sprinkler branches and installing of new sprinkler branches as per drawings.
 - .4 Removing existing and installing new Nitrogen generators and air tank in the three sprinkler rooms. Tie in monitoring points to respective fire alarm system as required by code.
 - .5 Tie in monitoring points to respective fire alarm system as required by code.
 - .6 Reconfiguring piping and re-installing valves in the three sprinkler rooms.
 - .7 Removing and installing a new heat trace line and control for an incoming fire suppression water pipe as per drawings and tie in monitoring of power supply by fire alarm system. Re-insulate pipe.
 - .8 Installing permanent labels for all valves a part of the sprinkler system and all low point drains and inspector test connections.
 - .1 The installing contractor shall identify a hydraulically designed sprinkler system with a permanently marked weatherproof (metal or rigid plastic sign) secured with corrosion resistant wire, chain, or other approved means.
 - .9 Replace all pipe sections, fittings and dry pipe valve trim that show signs of external corrosion as per drawings. New components are to be painted to prevent external corrosion.
 - .10 Installing new low point drains as per drawings.
 - .11 Re-locating inspectors test connection as per drawings.
 - .12 Replacing sprinklers as per drawings.
 - .13 Provide spare sprinkler heads for the spare sprinkler cabinet as per drawings. A list of all types of sprinkler heads is also to be provided.
 - .14 Reinstall existing stove chimney metal ducts and stove in the Big House. Two stoves need to be reassembled. Piping to be fitted together and riveted. Horns and strobes are to be reinstalled in these chimney ducts.
 - .15 Fire alarm upgrade for Big House, the Men's House, and the Furloft, including :
 - .1 End-of-line devices to have an identifying label securely attached to the front of the cover plate, listing the zone or device served. The end-of-

- line devices to be labelled and/or identified as per CAN/ULC S524-2019.
- .2 The intelligent addressable modules that are used to monitor contact devices (low pressure switch, alarm pressure switch, tamper switches...) and the fault isolator modules have to be labelled with the devices or circuits they serve.
- .3 To install new fire alarm demarcation boxes according to drawings. The monitoring of the fire alarm system to be provided in accordance with Sentence 3.2.4.8.(4) of the NBCC. This includes the monitoring of alarm. Supervisory and trouble signals and provided in conformance with CAN/ULC-S561-2020.
- .4 The temperature switch within sprinkler rooms to be installed to monitor room when approaching freezing temperatures. This switch is to be connected to the fire alarm system.
- .5 Install relay to shutdown fan (ERV) in the Big House upon activation of existing duct smoke detector. Shut down shall be achieved directly from the fire alarm to the motor controller (MCC) or unit, and not through a building management system.
- .6 Connecting fire alarm monitoring systems to phone lines in each building.
- .7 Installing cellular phone antennas in each of the 3 buildings and connecting fire alarm monitoring systems to them.
- .8 Install new heat detectors in the Men's House.
- .9 Install new fire alarm shutdown contactor for the ERV system.
- .3 Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by the property owner or their authorized agent. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.
- .4 Work also includes start-up, commissioning, and training of all systems installed.
- .5 Work includes demolition and removal of all existing materials that are to be replaced in the above work. Any property or features damaged during the demolition must be replaced or repaired to its original state.
- .6 Remove any waste material off site and dispose of properly.
- .7 All materials and workmanship must be as per stamped plans and specifications.
- .8 The maintenance work includes but not limited to:
 - .1 Inspection, testing and preventative maintenance activities of all electrical equipment indicated on drawing E-3, following ANSI/NETA MTS-2019, Standard for Maintenance Testing Specifications for Electrical Power Equipment and Systems.
 - .2 Comprehensive site visit to identify the precautions and planning required for the work, in regards to preparation, de-energization, safety, scheduling, and related activities.
 - .3 Contractor is to provide the Consultant with a set of their internal 'Test Sheets' that are proposed for use. The 'Test Sheets' are to outline the information that will be collected and recorded as part of the testing and maintenance scope of work. The test sheets must outline: the visual and mechanical inspections to be taken, the electrical testing that will be performed, the associated metrics and

- parameters that will be measured and recorded, the testing equipment, and other relevant information. The Test Sheets must capture all of the required testing and maintenance parameters required in the ANSI/NETA MTS-2019 standard. The Consultant will review and accept the use of the Test Sheets for use, or offer recommendations. Test Sheets are required for the Distribution Panelboards.
- .4 Contractor to take photos of each equipment after testing and maintenance. The collection of photos are to be compiled in a cloud-based shared storage system or USB and provided to Departmental Representative and the Consultant for review.
 - .5 Contractor is to record all results of the testing and maintenance activities through the pre-approved Test-Sheets.
 - .6 Contractor to provide comprehensive field-inspection notes on each piece of equipment, detailing any observed challenges, deficiencies, abnormalities and deviations from expected conditions. Contractor to provide photos for each note or abnormality that is observed. Any notes that pose a risk to the safe operation of the equipment or safety of personnel must be reported to the Consultant and Departmental representative immediately.
 - .7 If any remediation or repair work is conducted, contractor must provide a field-report that indicates the nature of the issue, the repairs that were undertaken, any parts that were used in the repairs, and the final functionality and result. Photographs must be taken and provided.
 - .9 Contractor is to provide O&M documentation throughout the project. Documentation includes Test-Sheets, field-notes, reports, shop-drawings and photographs. Documents will be reviewed throughout the project and will be part of the meeting agenda at construction meetings. Contractor to update the manual periodically and submit for review. Contractor to provide 2 final copies of the final copy of the O&M documentation.
 - .10 At the completion of the inspection and testing works, the Contractor is to provide one electronic copy of the report, complete with all Test-Sheets with test data and recordings, and summary of recommendations.
 - .11 Contractor to review the accuracy of the single-line-diagram throughout the project duration. All ratings and settings will be recorded in the corresponding Report or Test-Sheets. Any deviations from the single-line-diagram must be recorded. At the completion of the inspection and testing works, the Contractor is to provide one (1) scanned copy of the mark-ups to the single-line-diagram. The mark-ups will be reviewed and As-Built drawings will be generated by the Consultant.
 - .12 Any property or features damaged during the demolition must be replaced or repaired to its original state.

1.2 Contract method

- .1 Refer to contract General Conditions provided by Departmental Representative.

1.3 Work by others

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

1.4 Work sequence

- .1 Construct Work in stages to accommodate Departmental Representative's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Departmental Representative during construction.
- .3 Maintain fire access/control.

1.5 Historical Features, Previous Uses

- .1 Lower Fort Garry National Historic Site is a former Hudson's Bay Company trading post and trans-shipment center located next to the Red River near the town of Selkirk, MB. It was designated a National Historic site in 1950 for its significance as the place where Treaty Number 1 was made between the Ojibway and Swampy Cree of Manitoba and the Crown, for its assemblage of fur trade structures which represent a significant example of early stone architecture and for the role the fort played as a supply center for the fur trade of Western Canada.
- .2 The Fort has six federally designated heritage buildings by the Federal Heritage Building Review Office (FHBRO). The Big House and Furloft/Saleshop buildings are designated as a "classified" heritage property, the highest level of designation reserved for the best examples of federal built heritage. The Men's House is a "recognized" federal built heritage building.
 - .1 Reasons for the Big House designation:
 - .1 The Big House was constructed in 1830-32 as a residence and administrative office for the Hudson's Bay Company. The construction was overseen by Pierre Leblanc.
 - .2 The Big House was designated by FHBRO as Classified because of its historical associations, its environmental and local importance within Lower Fort Garry, and its architectural significance.
 - .3 Lower Fort Garry was an administrative headquarters for fur trading and the focal point of the lower Red River settlement as well as an important link to Britain. The construction of the Big House reflects the consolidation of the fur trade under the Hudson Bay Company and the development of the fort as a trans-shipment depot and agricultural supply center.
 - .4 The Big House is associated with George Simpson, Governor of the Hudson Bay Northern department's fur trade. He initiated the construction of the fort and the residence and office as a center from which to manage the fur trade. The house is also associated with the Northwest Mounted Police, whose initial headquarters were located at the fort.
 - .5 The Big House is a very good example of a residence and administrative building designed in the British Classical tradition. The "L"-shaped structure was built in two visually distinct stages, each with a dominant hip roof and domestically scaled symmetrical facades. The annex was constructed using colomage pierroté as the structural system. Extensively altered over the years, restoration to the 1850-52 period involved replacement of much of the remaining original fabric of the building.

- .6 The Big House is part of the historic enclave defined by the perimeter walls of the fort within which all the buildings have a cohesive design and visual unity. The central location of the Big House has ensured its prominence over the years.
- .2 Reasons for the Furloft/Saleshop designation:
 - .1 The Furloft/Saleshop was built in 1830-1831. Pierre Leblanc, a contractor employed by the Hudson's Bay Company, oversaw the construction of the building.
 - .2 The Furloft/Saleshop was designated Classified because of its historical associations, and its architectural and environmental values.
 - .3 The Furloft/Saleshop contributes to the character of the Lower Fort Garry site, one of Canada's largest remaining concentrations of fur trade structures, established by the Hudson's Bay Company in 1830.
 - .4 The Furloft/Saleshop represents the fort as a transshipment depot and agricultural centre for the Rupert's Land fur trade, regionally as supplier to the interior network of trading posts, and locally as a retail outlet.
 - .5 The Furloft/Saleshop was constructed to serve as a retail and warehouse/storage facility. It is a very good example of a warehouse building designed in the British Classical tradition.
 - .6 The Furloft/Salesshop confirms the character of other buildings at the site, all of which are constructed of stone or of timber frame with stone infill. All but one of the buildings dates from the 1830 to 1855 period and all but two are contained within the perimeter walls of the fort.
- .3 Reasons for the Men's House designation:
 - .1 The Men's House at Lower Fort Garry was constructed in 1850-54, with an annex built by 1858. Initially it was a group residence for unmarried male servants of the Hudson's Bay Company. The Men's House also served as a women's ward for the provincial lunatic asylum from 1885-86, followed by use as a stable, storage, ice-house and garage.
 - .2 The Men's House was designated as Recognized because of its historical associations, and its architectural and environmental values.
 - .3 The Men's House is associated with the continued development of Lower Fort Garry as a trans-shipment depot and agricultural supply center for the Canadian fur trade. The construction of the Men's House relates to the peak period of occupation of the fort and the need for more housing.
 - .4 The Men's House is a good example of a modest utilitarian design of domestic scale. The excellent functional quality of the building is reflected in the simple massing of the 'T' shaped plan, the colombage pierroté construction and the size and arrangement of the doors and windows. This reflects one of three traditional building techniques used within the fort.
 - .5 The Men's House is compatible with the adjacent buildings and the historic character of the fort setting. The Men's House is familiar to visitors as one of the interpreted areas of the fort.

1.6 Heritage Conservation Minimal Intervention Approach

- .1 Considerations of conservation are guided by a minimal intervention approach and advocate the maintenance and repair of elements instead of their replacement. Twelve specific standards will be followed as outlined in the Standards and Guidelines for the Conservation of Historic Places in Canada:
 - .1 Standard No. 1-Conserve the heritage value of a historic place. Do not remove, replace, or substantially alter its intact or repairable character-defining elements. Do not move a part of a historic place if its current location is a character-defining element.
 - .2 Standard No. 2-Conserve changes to a historic place which, over time, have become character-defining elements in their own right.
 - .3 Standard No. 3-Conserve heritage value by adopting an approach calling for minimal intervention.
 - .4 Standard No. 6-Protect and, if necessary, stabilize a historic place until any subsequent intervention is undertaken. Protect and preserve archaeological resources in place. Where there is potential for disturbance of archaeological resources, take mitigation measures to limit damage and loss of information.
 - .5 Standard No. 7-Evaluate the existing condition of character-defining elements to determine the appropriate intervention needed. Use the gentlest means possible for any intervention. Respect heritage value when undertaking an intervention.
 - .6 Standard No. 8-Maintain character-defining elements on an ongoing basis. Repair character-defining elements by reinforcing their materials using recognized conservation methods. Replace in kind any extensively deteriorated or missing parts of character-defining elements, where there are surviving prototypes.
 - .7 Standard No. 9-Make any intervention needed to preserve character-defining elements physically and visually compatible with the historic place, and identifiable upon close inspection. Document any intervention for future reference.
 - .8 Standard No. 10-Repair rather than replace character-defining elements. Where character-defining elements are too severely deteriorated to repair, and where sufficient physical evidence exists, replace them with new elements that match the forms, materials and detailing of sound versions of the same elements. Where there is insufficient physical evidence, make the form, material and detailing of the new elements compatible with the character of the historic place.
 - .9 Standard No. 11-Conserve the heritage value and character-defining elements when creating any new additions to a historic place or any related new construction. Make the new work physically and visually compatible with, subordinate to and distinguishable from the historic place.
 - .10 Standard No. 12-Create any new additions or related new construction so that the essential form and integrity of a historic place will not be impaired if the new work is removed in the future.
 - .11 Standard No. 13-Repair rather than replace character-defining elements from the restoration period. Where character-defining elements are too severely deteriorated to repair and where sufficient physical evidence exists, replace them with new elements that match the forms, materials and detailing of sound versions of the same elements.

- .12 Standard No. 14-Replace missing features from the restoration period with new features whose forms, materials and detailing are based on sufficient physical, documentary and/or oral evidence.

1.7 Contractor use of premises

- .1 The entire site is a heritage and archaeologically sensitive zone. Refer to Section 01 14 00 - Work Restrictions for access and egress requirements. Coordinate laydown, parking and other areas as required, shown in C1, with the Departmental Representative.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Prevent migration of dust and debris to non-designated work areas.
- .6 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .7 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.8 Parks Canada occupancy

- .1 Parks Canada will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Parks Canada in scheduling operations to minimize conflict and to facilitate Parks Canada usage.
- .3 The site is open to the general public for the duration of the project.

1.9 Alterations, additions or repairs to existing building

- .1 Execute work with least possible interference or disturbance to building operations, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .2 Notify Departmental Representative if relocation or installation of new material requires building operations or penetrations not indicated on contract drawings.
- .3 Restrict construction activities to designated work areas. Do not store materials, tools or equipment outside of designated work areas. Where Work must proceed outside of designated areas, arrange scheduling with Departmental Representative before start of such work.
- .4 Use only designated entrances, and corridors for access to work areas, delivery of materials and equipment, and removal of construction debris. Do not block exits.

1.10 Documents required

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .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 Fire Safety Plan and Emergency Procedures (emergency evacuation procedures, fire watch procedures and system impairment procedures)
- .12 Other documents as specified.

1.11 Request for information

- .1 Maintain a Request for Information (RFI) system for questions regarding clarifications. A RFI must be a written document submitted in electronic form which as a minimum includes the following details:
 - .1 Date.
 - .2 Project name and number.
 - .3 Contractor's contact information.
 - .4 Reference to the drawings and/or specifications (when applicable).
 - .5 Location of the work in question.
 - .6 A complete description of the question.
 - .7 Affects this item will have on other work.
 - .8 Affects this item will have on the cost of the project.
 - .9 Affects this item will have on the construction schedule.
 - .10 Suggested solution to resolve the question(s).
 - .11 Date that the response to the RFI is required by.
 - .12 An area for a response to the RFI to be provided.
- .2 A RFI form is to be prepared with headings and spaces for the above mentioned information to be filled into. Hand-written RFIs will not be accepted.
- .3 The Contractor is to allow a minimum of 3 days for the Departmental Representative to provide a response.
- .4 The Departmental Representative's response does not authorize changes to the contract scope, price, or schedule.
- .5 RFIs are intended for clarification of site conditions, drawings, or specifications. RFIs shall not be used by the Contractor to identify potential errors or omissions in the Contract Documents. In the case of potential errors or omissions in the Contract Documents, communicate directly with the Departmental Representative for clarifications.

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 Access and egress

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
- .2 Establish access routes to and from the work areas. Use only designated access routes for movement of workers, tools, equipment, materials, and construction debris.
- .3 Maintain existing roads and walkways.
- .4 Maintain safe access and egress at all building doors. Provide access and egress hoarding in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.2 Use of site and facilities

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Contractor to provide sanitary facilities for use by Contractor's personnel in their laydown area. Facilities are to be kept clean.
- .5 Closures: protect work temporarily until permanent enclosures are completed.
- .6 Coordinate lay down locations with Departmental Representative. Protect lay down areas with adequate ground protection.

1.3 Historical Objects and Furnishings

- .1 The building contains furnishings and historical objects. Protect furnishings and objects remaining in work areas and adjacent spaces from dust and debris in accordance with requirements of Section 01 56 00 - Temporary Barriers and Enclosures
- .2 If furnishings or objects are obstructing the work areas:
 - .1 Cease Work in affected area immediately
 - .2 Do not move or handle historic objects or furnishings
 - .3 Immediately notify Departmental Representative, and wait for instructions.
 - .4 Protect objects or furnishings from damage
 - .5 Resume activity when permitted to proceed with Departmental Representative authorization.

1.4 Alterations, additions or repairs to existing building

- .1 Execute work with least possible interference or disturbance to building operations and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .2 Notify Departmental Representative if relocation or installation of new material requires building operations or penetrations not indicated on contract drawings.
- .3 Restrict construction activities to designated work areas. Do not store materials, tools or equipment outside of designated work areas. Where Work must proceed outside of

- designated areas, arrange scheduling with Departmental Representative before start of such work.
- .4 Use only designated entrances, and corridors for access to work areas, delivery of materials and equipment, and removal of construction debris. Do not block exits.
- .5 Work is to follow the guidance of Standards and Guidelines for the Conservation of Historic Places in Canada as found in Section 01 11 00 - Summary of Work.

1.5 Existing services

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Submit schedule to and obtain approval from Departmental Representative and Consultant 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. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Where unknown services are encountered, immediately advise Consultant and Departmental Representative, confirm findings in writing.
- .4 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .5 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 Security

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

1.7 Building smoking environment

- .1 Comply with smoking restrictions. Smoking is not permitted within the fort walls or historic grounds.
- .2 Smoking is only permitted in Contractor vehicles and in the Contractor Laydown area shown on drawing sheet C1. Use receptacles for product disposal.
- .3 Contractor shall provide suitable receptacles.

1.8 Heating

- .1 Big House
 - .1 Contractor is required to maintain air temperature at or above 13 degrees C in flood affected areas until 30 days after completion of the repairs to facilitate sprinkler repairs, and allow any areas where plastering or painting has occurred to properly dry and cure and to protect artifacts housed in this building. This includes attic spaces, main floor rooms 11, 12, 13, 14 and basement rooms B-3 B-4. Parks Canada is responsible to maintain heat in the remainder of the building for the duration of the contract.
- .2 Furloft and Men's House
 - .1 Contractor is required to maintain 10 degrees C until the completion, testing and commissioning including a full trip test of the sprinkler systems in these buildings to facilitate sprinkler repairs and acceptance.

- .2 Parks Canada will install dataloggers to monitor these requirements in each building.

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Administrative

- .1 Schedule and administer project meetings throughout the progress of the work
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting two days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Representative of Contractor, Subcontractor and Suppliers attending meetings will be qualified and authorized to act on behalf of the party each represents.

1.2 Preconstruction 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 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Departmental Representative will establish time and location of meeting and notify parties concerned minimum five Working Days before meeting.
- .4 Departmental Representative will chair Start-Up Meeting, record minutes, and distribute minutes to all attending parties within four Working Days of meeting.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .3 Critical work sequencing and long-lead items.
 - .4 Lines of communications.
 - .5 Procedure for RFIs.
 - .6 Schedule of Work, progress scheduling.
 - .7 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .8 Safety, OHS, and COVID protocols as applicable while on site.
 - .9 Site security
 - .10 Fire safety planning and System impairment planning.
 - .11 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .12 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .13 Departmental Representative provided products.

- .14 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .15 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .16 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .17 Monthly progress claims, administrative procedures, photographs, hold backs.
- .18 Appointment of inspection and testing agencies or firms.
- .19 Access and use of site and existing buildings.
- .20 Environmental protection
- .21 Commissioning.
- .22 Mid construction reviews and Final acceptance inspections.
- .23 Insurances, transcript of policies.
- .6 Submit Construction Progress Schedule and Shop Drawing Submittal Schedule at initial start-up meeting.

1.3 Progress meetings

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings monthly.
- .2 Contractor, major Subcontractors involved in Work Departmental Representative are to be in attendance.
- .3 Notify parties minimum 2 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 2 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Definitions

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

1.2 Requirements

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

1.3 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.
- .4 Submit site-specific Health and Safety Plan, EPP (Environmental Protection Plan), SRP (Hazardous Material Spill Response Plan i.e. fuel spill) and ERP (Emergency Response Plan i.e. evacuation procedures etc.), hot work safety procedures within 7 days after date

of Notice to Proceed and prior to commencement of Work. These documents will be reviewed by the Departmental Representative and must be approved prior to any work on site commencing.

- .1 Health and Safety Plan must include at minimum but not limited to:
 - .1 Results of site specific safety hazard and COVID-19 assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Submit any COVID-19 documents as provincially and/or federally required.
- .2 Environmental Protection Plan/ Spill Response Plan. In the event of any spill, regardless of the quantity, containment and cleanup are at the full cost and the responsibility of the contractor. The Departmental Representative is to be notified immediately. Spills to be dealt with immediately in accordance with the spill response plan, including reporting. Environmental Protection Plan/ Spill Response Plan must at minimum but not limited to include the following:
 - .1 How fueling will be done?
 - .2 Type of fuel to be used?
 - .3 Size of storage tank?
 - .4 Approximate frequency of refuelling.
 - .5 If the fuelling system is automated or manual
 - .6 Where shut downs are located?
 - .7 Safeguards in place in the event of emergency.
 - .8 Contact names and numbers for equipment owner.
 - .9 Contact names and numbers in the event of an emergency.
- .3 Hot Work Safety Plan Hot work increases the risk of fire onsite. The contractor is responsible to ensure all staff conducting hot work are properly trained and authorized to safely conduct the work they are carrying out. Hot work equipment is to be inspected prior to each use to ensure its safe operating. This can include, but is not limited to welding, soldering and cutting. A Hot Work Safety Plan is to be submitted prior to work commencing. Parks Canada requires notice prior to conducting hot work to prevent the accidental activation of the fire alarm system. The plan shall include at minimum, but not limited to:
 - .1 Procedures and safe usage protocols for all heat, flame and spark-producing equipment
 - .2 Establishing the location of hot work areas
 - .3 Identifying the proper personal protective equipment (PPE) needed during the hot work procedures
 - .4 Process for air monitoring in the event a potentially explosive atmosphere is identified.
 - .5 Process for notifying Departmental Representative that hot work is commencing and ending to allow for fire alarm systems to be shut down and reactivated again.
 - .6 These plans are to be onsite at all times. Onsite staff are to have the ability to comply and implement them confidently as fully trained individuals.

1.4 Project schedule

- .1 Develop detailed Project Schedule derived from Master Plan.

1.5 Project schedule reporting

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

1.6 Project meetings

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

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Administrative

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

1.2 Shop drawings and product data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 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.
- .3 Allow 3 days for Departmental Representative review of each submission.
- .4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.

- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.
- .7 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 Relationship to adjacent work.
- .8 After Departmental Representative review, distribute copies.
- .9 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.

- .13 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Departmental Representative, 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.
- .20 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

1.3 Substitution Procedures

- .1 Substitution Requests: Submit electronic copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - .1 Departmental Representative's Action: If necessary, Departmental Representative will request additional information or documentation for evaluation within five Working Days of receipt of a request for substitution. Departmental Representative will notify Contractor of acceptance or rejection of proposed substitution within 10 Working Days of receipt of request, or five Working Days of receipt of additional information or documentation, whichever is later.
 - .1 Forms of Acceptance: Change Order, Change Directive, or Supplemental Instructions for minor changes in the Work.
 - .2 Use product specified if Departmental Representative does not issue a decision on use of a proposed substitution within time allocated.
- .2 Quality Assurance
 - .1 Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

- .3 Procedures
 - .1 Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.4 Photographic Documentation

- .1 Intent
 - .1 Provide digital photographs of buildings, grounds, and site features to record existing conditions prior to, during, and at completion of Work
 - .2 Use digital camera with capability of producing digital images at minimum 12 megapixels, uncompressed, saved in *.jpeg format
 - .3 Name photos identifying building name and photo location.
- .2 General
 - .1 Keep complete collection of photographs on site.
 - .2 Submit photographs to Departmental Representative on USB memory stick, or email as a WinZip file.
 - .3 Format:
 - .1 Colour digital photos, fine resolution of minimum 12 megapixels
 - .2 RAW format for pre-construction, and post-construction.
 - .3 PDF and JPEG format for construction progress photographs.
 - .4 Photograph Quality
 - .1 Well-illuminated, proper exposure
 - .2 Clarity: Sufficiently clear to distinguish differences in the pre-construction and post-construction photographs, and allow future reinstallation of restored items in the original locations
 - .5 Indicate project name and number, and date photograph was taken on each photograph
 - .6 Provide key plan and elevation drawings identifying location of photographs.
 - .7 Viewpoints: interior and exterior viewpoints, including close ups of specific details in locations as determined by the Departmental Representative, and as indicated
 - .1 Clearly establish viewpoints and identify them by numbering them with the same first number for the same viewpoint followed by a second number for each stage of work.
 - .2 Example: 1.0 - pre, 1.1 - demo, 1.2 - resto, 1.3 - reins, 1.4 - comp.
- .3 Pre-Construction Photographs
 - .1 Submit a complete photographic record of the condition of the existing building fabric (all materials and components) before start of Work
 - .2 Do not start work in the location until the photographic record has been reviewed by the Departmental Representative

- .3 Number of images per set: as required to document each building, site feature, and area of Work.
- .4 Number of sets: One set per building, site feature, or area of Work.
- .4 Construction Progress Photographs
 - .1 Provide photographs to record progress of the Work
 - .2 Number of images per set: as required to document each building, site feature, and area of Work.
 - .3 Number of sets: One set per building, site feature, or area of Work
 - .4 Frequency: Submit updated images monthly with progress statement, except submit more frequently as directed by Departmental Representative for individual sets.
- .5 Final Photographs
 - .1 Provide photographs at completion of Work to record condition of site features, surrounding buildings, and new construction.
 - .2 Number of images per set: as required to document each building, site feature, and area of Work.

Part 2 Products

2.1 Substitution Products

- .1 Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 10 Working Days prior to time required for preparation and review of related submittals.
- .2 Substitutions for Convenience: Not allowed during construction
- .3 A request for substitution constitutes a representation that the Contractor:
 - .1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product, is consistent with the Contract Documents and will produce indicated results, will not adversely affect the construction schedule, is compatible with other portions of the Work, and has received necessary approvals of the authorities having jurisdiction.
 - .2 Will provide the same or better warranty for the Substitution as for the specified Product.
 - .3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Departmental Representative
 - .4 Waives claims for additional costs or time extension which may subsequently become apparent.
 - .5 Will reimburse Departmental Representative for review or redesign services associated with re-approval by authorities.

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Reference standards

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 National Fire Code of Canada-2015,
 - .1 Section 5.6. Construction and Demolition Sites
- .3 National Building Code of Canada -2015
 - .1 Part 8 Safety Measures at Construction and Demolition Sites
- .4 Province of Manitoba
 - .1 The Workers Compensation Act RSM 1987 - Updated 2013.

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: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard and COVID-19 assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Submit any COVID-19 documents as provincially and/or federally required.
- .3 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.
- .4 Submit copies of incident and accident reports.
- .5 Submit WHMIS Safety Data Sheets (SDS).
- .6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .7 Departmental Representative 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 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 Safety assessment

- .1 Perform site specific safety hazard assessment related to project before commencing in a task.

1.4 Meetings

- .1 Schedule and administer Health and Safety meeting with Departmental Representative 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 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

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 be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Be responsible for ensuring the grounds, air, trees and water are not damaged by Work the Contractor undertakes. If any spills, leaks or environmental contamination occurs. It is the Contractor's responsibility to clean up according to federal, provincial and territorial standards. All costs due to direct or indirect impact on the site are the contractor's sole responsibility; Park Canada reserves the right to review the full scope of site restoration.

1.8 Fuel Containment and Spills

- .1 The Contractor is responsible for spill prevention and containment throughout the contract. The following measures will be followed, but are not limited to these requirements below to ensure spill prevention and equipment maintenance:
 - .1 Maintain and operate equipment and machinery to minimize losses of coolant, hydraulic fluids, lubricants, and fuels.
 - .2 All equipment brought to the site to be inspected and report provided to Departmental Representative. All equipment to be inspected for leaks and worn hoses daily,
 - .3 Fueling to be undertaken in the designated fueling area only and by trained personnel. Fueling area to be located at least 30 m from the nearest down gradient watercourse. Fueling location to be approved by the Departmental Representative and Environmental Manager prior to use.
 - .4 Equipment with fuel leaks, or excessive oil or grease will not be permitted to enter the site;
 - .5 Drip trays or absorbent sheeting to be placed beneath equipment when stationary.
 - .6 Trays to be placed beneath the oil and hydraulic fluid reservoirs;
 - .7 Generators to have secondary containment;
 - .8 Work to be immediately stopped if equipment is leaking fluid;
 - .9 All equipment leaks to be repaired prior to re-commencing work;
 - .10 Maintenance of equipment to be conducted in the fueling area;
 - .11 Fuel cans and pumps to be stored in secondary containment and taken offsite or secured onsite at the end of each work day.

- .12 Damaged equipment that is leaking fuel to remain contained in the fueling area until leak is repaired, and Departmental Representative has inspected and approved its removal from site;
- .13 Contractor to provide appropriate spill kits for all work areas, vehicles, machinery, and mobile equipment on site;
- .14 Any fuel operated heating systems such as diesel, gas, oil, must have a spill containment system included that is able to accommodate the full amount of fuel the tank will hold to prevent ground penetration and pollution.
- .15 In the event of any spill, regardless of the quantity, containment and cleanup are at the full cost and the responsibility of the contractor. The Departmental Representative is to be notified immediately. Spills to be dealt with immediately in accordance with the spill response plan, including reporting.

1.9 Compliance requirements

- .1 Comply with the Occupational Health and Safety Acts and Regulations of the Province Having Jurisdiction
- .2 Comply with Occupational Health and Safety Regulations, 2022.
- .3 Comply with Construction and Demolition Sites and all requirement within for fire safety on site and for the protection of occupants as per National Fire Code of Canada, Section 5.6-2015
- .4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

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

1.11 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 working knowledge of occupational safety and health regulations.
 - .2 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.
 - .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .4 Be on site during execution of Work and report directly to the Departmental Representative.

1.12 Correction of non-compliance

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

- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 Work stoppage

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

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 References to regulatory requirements

- .1 Perform Work in accordance with the 2015 edition of the 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 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
- .3 Codes, Acts, Standards, Regulations
 - .1 General
 - .1 The automatic sprinkler and fire alarm and detection systems were installed in 2017 and were designed to the following referenced Codes and Standards:
 - .1 National Building Code of Canada, 2010, with Manitoba Amendments.
 - .2 CSA C22.1-09, Canadian Electrical Code.
 - .3 National Plumbing Code of Canada, 2010, with Manitoba Amendments.
 - .4 National Fire Code of Canada, 2010, with Manitoba Amendments.
 - .5 CSA Z320-11 – Building Commissioning Standard and Check Sheets.
 - .6 Underwriters' Laboratories of Canada (ULC)
 - .7 CAN/ULC-S537-2013 “Standard for Verification of Fire Alarm Systems”
 - .8 CAN/ULC-S524-2014-AMD:1, “Standard for the Installation of Fire Alarm Systems”
 - .9 CAN/ULC-S524-2014, Standard for the Installation of Fire Alarm Systems.
 - .10 CAN/ULC-S525, Audible signal Appliances for Fire Alarm Systems.
 - .11 CAN/ULC-S526-07, Visible Signal Devices for Fire Alarm Systems, Including Accessories.
 - .12 CAN/ULC-S527-99, Standard for Control Units for Fire Alarm Systems.
 - .13 CAN/ULC-S528-05, Manual Stations for Fire Alarm Systems, Including Accessories.
 - .14 CAN/ULC-S529-09, Smoke Detectors for Fire Alarm Systems.
 - .15 CAN/ULC-S530-91(R1999), Heat Actuated Fire Detectors for Fire Alarm Systems.
 - .16 CAN/ULC-S531-02, Standard for Smoke Alarms.

- .17 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
- .18 CAN/ULC-S537-04, Standard for the Verification of Fire Alarm Systems.
- .19 National Fire Protection Association (NFPA):
 - .1 NFPA 13 “Standard for the Installation of Sprinkler Systems” (2013 Edition)
 - .2 NFPA 14 Installation of Standpipe and Hose Systems.
 - .3 NFPA 17 Dry Chemical Extinguishing Systems
 - .4 NFPA 72 National Fire Alarm Code
 - .5 NFPA 101 Life Safety Code
- .20 Local and Provincial Building Codes
- .21 All requirements of the Authority Having Jurisdiction (AHJ)
- .2 Current Project Requirements
 - .1 The current scope of work requires that the automatic sprinkler system and fire alarm and detection systems meet, as a minimum, the following Codes, Standards and referenced documents within:
 - .1 National Building Code of Canada, 2015.
 - .2 National Plumbing Code of Canada, 2015.
 - .3 National Fire Code of Canada, 2015.
 - .4 CSA C22.1 2018, “Canadian Electrical Code”.
 - .5 CAN/ULC-S537-2019 REV 1, “Standard for Verification of Fire Alarm Systems”
 - .6 CAN/ULC-S524-2019, “Standard for the Installation of Fire Alarm Systems”
 - .7 CAN/ULC-S1001-11 REV1-2019, “Integrated Systems Testing of Fire Protection and Life Safety Systems”
 - .8 CAN/ULC-S561-2020-REV1, “Standard for Installation and Services for Fire Signal Receiving Centres and Systems”
 - .9 National Fire Protection Association (NFPA):
 - .1 NFPA 13 “Standard for the Installation of Sprinkler Systems” (2019 Edition)
 - .10 Provincial Building Codes
 - .11 All requirements of the Authority Having Jurisdiction (AHJ)
 - .12 The expectation was and will be to meet or exceed requirements of Specified standards, codes and referenced documents identified in section 1.7.2; and Contract documents
 - .13 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code. Meet or exceed requirements of:
 - .1 Contract documents.

- .2 Specified standards, codes and referenced documents.

1.2 Hazardous material discovery

- .1 1. Asbestos and lead are found onsite. There is asbestos in the window putty in the Big House basement and there is lead paint in the window wells of the Big House basement. The Furloft has lead paint in the window trim. There could be asbestos in the window putty in the Men's House and Furloft, however the scope of work does not include disturbing these specific areas.
- .2 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative and await direction on how to proceed.

1.3 Building smoking environment

- .1 Comply with smoking restrictions and municipal by-laws. Smoking is not permitted within the fort walls or on historical grounds. Smoking is only permitted in contractor vehicles or in contractor laydown area as indicated on drawing number C1.
- .2 Contractor to provide receptacles.

1.4 Quality assurance

- .1 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements.

Part 2 Products

2.1 Permits

- .1 Permits:
 - .1 Contractor shall apply for, obtain, and pay for necessary permits where required by Authority Having Jurisdiction (AHJ). The AHJ is Parks Canada.
 - .2 AHJ will issue appropriate instructions to Contractor for correction to Work where Contract Document deficiencies are required to be corrected in order to obtain occupancy permits, including partial occupancy permits.
 - .3 Contractor shall correct deficiencies in accordance with AHJ's instructions. Where deficiency is not corrected, Departmental Representative reserves the right to make correction and charge Constructor for costs incurred.

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Inspection

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

1.2 Independent inspection agencies

- .1 Provide equipment required for executing inspection and testing by appointed agencies.
- .2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Park Canada. Pay costs for retesting and reinspection.

1.3 Access to work

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.4 Procedures

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

1.5 Rejected work

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

- .2 Contractor to repair any damages as a result of contractor outside of scope by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 Reports

- .1 Submit 2 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to any subcontractor of work being inspected or tested, and manufacturer or fabricator of material being inspected or tested.

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 acceptable to Departmental Representative..
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Action and informational submittals

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

1.2 Installation and removal

- .1 Contractor to prepare a site plan. Refer to drawing number C1 for where the preapproved laydown area is, where fencing is to be installed for each building and roads for site access. Contractor's plan to detail 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. Contractor to supply and install fencing for their laydown area.
- .2 Contractor to indicate use of supplemental or other staging area's on site map provided by Parks Canada.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.
- .5 Fencing:
 - .1 Contractor to supply and install fencing around the buildings to prevent public access.
 - .2 Above ground foot or anchor blocks for fencing required. Below ground surface anchoring, digging or pounding in for fence anchoring is not permitted.

1.3 Scaffolding

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide scaffolding location plan to Departmental Representative. Indicate type of scaffolding to be used.
- .3 Below ground surface anchoring, digging or pounding in of scaffolding supports is not permitted.
- .4 Provide ground protection under scaffolding.

1.4 Lifts/Hoisting

- .1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists cranes to be operated by qualified operator.
- .3 Maintain 2-metre buffer zone between equipment and heritage buildings.

1.5 Site storage/loading

- .1 Do not load or permit to load any part of Work with weight or force that will endanger Work, the area surrounding the heritage structures or heritage furnishing.

1.6 Construction parking

- .1 Parking will be permitted in the laydown area as indicated in Drawing C1.
- .2 No parking is permitted on grass or landscaped areas.
- .3 Provide and maintain adequate access to project site.

- .4 All vehicles and deliveries are restricted to established roadways.

1.7 Security

- .1 Comply with existing site security requirements. Consult with Departmental Representative for security protocols and requirements.
- .2 Contractor responsible for the security of their construction and laydown areas.

1.8 Equipment, tool and materials storage

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof structures for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof structures in laydown area in manner to cause least interference with work activities.

1.9 Sanitary facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Locate sanitary facilities in secured laydown area.
- .3 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 Protection and maintenance of traffic

- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .2 Lower Fort Garry is open to the public for the duration of this contract. Periodic use of roads other than those to and from the contractor laydown area (as indicated in drawing number C1) such as those inside historic grounds to be discussed and pre-approved by Departmental Representative.
- .3 Protect travelling public from damage to person and property. Maintain 2-metre buffer zone between equipment and heritage buildings.
- .4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

1.11 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.

1.12 Construction Signage

- .1 Provide and erect project identification sign marking fenced laydown areas and construction facilities, within three weeks of signing Contract, in a location designated by Departmental Representative.

- .2 Provide project identification site sign comprising foundation, framing, and one 1200 by 2400 mm signboard as detailed and as described below.
- .3 Foundations: no subsurface foundations for signage permitted.
- .4 Contractor signage to be submitted for approval by Departmental Representative
- .5 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .6 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.
- .7 No other signs or advertisements, other than warning signs, are permitted on site.

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Reference standards

- .1 National Building Code of Canada -2015
 - .1 Part 8 Safety Measures at Construction and Demolition Sites

1.2 Installation and removal

- .1 Provide temporary controls and barriers as indicated on Sheet C1 in order to execute Work expeditiously.
- .2 Remove from site all such work after use.
- .3 Do not attach or anchor temporary barriers and enclosures to Heritage Buildings or landscape features.

1.3 Access to site

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

1.4 Fire routes

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

1.5 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.

1.6 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 with Departmental Representative locations and installation schedule 5 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.7 Waste management and disposal

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

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Reference standards

- .1 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves the right to have such products or systems tested to prove or disprove conformance.
- .3 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

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 Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, handling and protection

- .1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) and safety data sheet (SDS) / material safety data sheet (MSDS) / product safety data sheet (PSDS) regarding use, handling, and storage of materials.

- .2 Handle and store products as per manufacturer's recommendations and or in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .3 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.
- .4 Store products subject to damage from weather in weatherproof enclosures.
- .5 Store sheet materials, like lumber or flat-packs on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .6 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.
- .7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .8 Touch-up damaged factory finished surfaces to Departmental Representative, satisfaction. 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 Departmental Representative will be paid for by Departmental Representative. 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 Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 Quality of work

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right 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 Coordination

- .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 Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.10 Remedial work

- .1 Refer to Section 01 73 00 - Execution.
- .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 indicated as approximate. Confirm locations with Departmental Representative before installation.
- .2 Inform Departmental Representative of conflicting installation. Install as directed by Departmental Representative.

1.12 Fastenings

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent 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 securing exterior 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.
- .7 Any historic looking cut nails necessary to reinstall baseboard, crown molding, and chair rails will be supplied by Parks Canada. Contractor to supply any GRK screws as necessary for install of baseboard, crown molding and chair rail.

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 of Departmental Representative.

1.15 Existing utilities

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.
- .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 - Not Used

Part 3 Execution - 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 Work of Departmental Representative or 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 Departmental Representative or 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 Incorporate previously salvaged, existing materials in reconstruction as dictated by the drawings and Departmental Representative permission, as specified, or as indicated. Pieces of millwork will be marked as to exact location for re-installation.
- .3 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. Notify Departmental Representative if conditions require additional work or alteration of work proposed.
- .3 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .4 Provide protection from elements for areas which are to be exposed by uncovering work; 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 Execute Work by methods to avoid damage to other Work, removing only that which is damaged to a provide proper surface which will receive patching and finishing.
- .7 Where additional openings or penetrations to building fabric are required, work must be completed without alteration to original historic fabric. Approval by Departmental Representative is required prior to cutting or drilling is required
- .8 Prevent the migration of dust and debris to non-work areas.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.5 Waste management and disposal

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

1.6 Quality Assurance

- .1 Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - .1 Structural Elements: When cutting and patching structural elements, notify Departmental Representative of locations and details of cutting and await directions from Departmental Representative before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - .2 Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - .1 Primary operational systems and equipment.
 - .2 Fire separation assemblies
 - .3 Air or smoke barriers
 - .4 Fire-suppression systems
 - .5 Mechanical systems piping and ducts.
 - .6 Control systems.
 - .7 Communication systems
 - .8 Fire-detection and -alarm systems
 - .9 Electrical wiring systems
 - .10 Operating systems of special construction.

- .3 Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - .1 Water, moisture, or vapour barriers
 - .2 Membranes and flashings
 - .3 Sprayed fire-resistive material
 - .4 Equipment supports.
 - .5 Piping, ductwork, vessels, and equipment
 - .6 Noise- and vibration-control elements and systems.
- .4 Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Departmental Representative's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

Part 2 Products

2.1 Materials

- .1 In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that match the forms, composition and detailing of sound versions of the same elements and that visually match in-place adjacent surfaces to the fullest extent possible.
 - .1 If identical materials are unavailable, cannot be used or where there is insufficient physical evidence, use materials that, when installed, will provide a match acceptable to Departmental Representative for the visual and functional performance of in-place materials.
- .2 Incorporate salvaged, used material in new construction as indicated, specified or only with Departmental Representative permission.
- .3 Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Parks Canada property, demolished materials shall become Contractor's property and shall be removed from Project site.

Part 3 Execution

3.1 Examination

- .1 Existing Conditions: The existence and location of services and construction indicated as existing are not guaranteed. Before beginning, investigate and verify the existence and location of mechanical and electrical systems, and other construction affecting the Work. Photograph existing conditions as specified in Section 01 33 00 Submittal Procedures.
- .2 Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with installer or applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

- .1 Examine the existing condition of building elements to determine how to apply a minimal intervention approach using the gentlest means possible for any intervention and respecting heritage value.
- .2 Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
- .3 Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
- .4 Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- .5 Existence and location of concealed utilities and construction indicated as existing are not guaranteed. Before beginning Work, investigate and verify existence and location of mechanical and electrical systems, and other construction affecting the Work.
- .3 Beginning of cutting and patching, and construction means acceptance of existing conditions and implies dimensions have been considered, verified and are acceptable.
- .4 Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions
- .5 Hazardous Materials: Hazardous materials are known to be present in building materials where interior alteration work is scheduled. Refer to Section 00 31 00 – Available Project Information for types and locations of hazardous materials.
 - .1 Should material resembling hazardous materials be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .2 Do not proceed until written instructions have been received from Departmental Representative.

3.2 Notice

- .1 Notify Departmental Representative before disrupting building access or services.

3.3 Preparation

- .1 Field Measurements: Take field measurements as required to fit the Work properly
- .2 Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.4 Installation

- .1 General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - .1 Make vertical work plumb and make horizontal work level.
 - .2 Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement
- .2 Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- .3 Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- .4 Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

- .5 Tools and Equipment: Do not use tools or equipment that produce harmful noise levels
- .6 Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- .7 Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions

3.5 Cutting and Patching

- .1 Cutting and Patching, General: Assign work of moving, removal, cutting and patching to trades qualified to perform work in manner to cause least damage to each type of work.
 - .1 Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- .2 Temporary Support: Provide temporary support of work to be cut.
- .3 Protection: Protect in-place construction during cutting and patching to prevent damage. Provide temporary dust screens, covers, railings, supports and other protection as required.
- .4 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 11 00 - Summary of Work.
- .5 Where Work of this Contract affects existing structures, equipment, roofing, ceiling or floor assemblies, piping, ductwork or conduit, etc. above, below or beyond areas of scheduled work, patch and repair to standard of construction of surrounding materials. Do such work at no additional cost to the Contract.
- .6 Where penetrations through existing walls or floors result from the installation of new equipment, or the removal or relocation of existing equipment, piping, ductwork or conduit, repair to standard of construction of surrounding materials.
- .7 Existing Mechanical/Electrical Systems:
 - .1 Where existing services/systems are required to be replaced, removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas
 - .2 Arrange for temporary disruption of existing services with Departmental Representative
- .8 Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, using methods least likely to damage adjoining construction.
 - .1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use
 - .2 Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

- .3 Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
- .4 Proceed with patching after construction operations requiring cutting are complete.
- .5 Remove or cut openings in interior partitions to accommodate new work.
- .6 Cut finish surfaces, plaster, metals by methods to terminate surfaces in straight lines, at natural points of division.
- .9 Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable
 - .1 Fire-Resistant Rated Assemblies: Where infill or patching occurs in a fire resistance rated assembly, use materials to match rating of existing assembly.
 - .2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish into retained adjoining construction in a manner that will minimize evidence of patching and refinishing
 - .1 Make smooth, approved transition where new work abuts, finishes flush with existing work
 - .2 Patch, and repair to provide an even-plane surface of uniform appearance
 - .3 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance
 - .1 Terminate existing surface along straight lines at natural division line, provide approved trim when finished surfaces cut in manner preventing smooth transition with new work.
 - .2 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces at a distance of 1.5 m.
 - .4 Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure
- .10 Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces

End of Section

Part 1 General

1.1 Project cleanliness

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Parks Canada or other Contractors.
- .2 Protect non-work surfaces and floors from spills and against debris accumulation preventing the need for excessive cleaning or repair non-construction surfaces.
- .3 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .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 off site in appropriate manner. Do not use on-site garbage and recycling containers, nor toilets, sinks or drains for waste-water or the cleaning of equipment.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations. Provide dust and debris isolation methods to limit the spread of dust and debris to other rooms.
- .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.
- .12 Take precautions to prevent depositing of mud and debris on roadways, boardwalks, on and adjacent areas to the area of Work. Promptly clean up mud and debris.

1.2 Final cleaning

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

- .7 Clean and polish mechanical and electrical fixtures impacted by work. 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 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .12 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .13 Remove dirt and other disfiguration from exterior surfaces.
- .14 Sweep and wash clean paved areas.
- .15 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .16 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .17 Remove waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Definitions

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re modeling operations. repair and demolition
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
- .4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:
 - .1 Solvents in paints and other coatings;
 - .2 Wood preservatives; strippers and household cleaners;
 - .3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
 - .4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.
- .17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- .18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.2 Administrative requirements

- .1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.
- .2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings before starting any Work of the Contract attended by the Contractor, affected Subcontractor 's and Departmental Representative to discuss the Contractor 's 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 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; Departmental Representative will provide commentary before development of Contractor 's Construction Waste Management Plan.
 - .2 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:

1.4 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.
- .4 Protect, stockpile, store, and catalogue salvaged items.
- .5 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facilities.
- .6 Protect surface drainage, mechanical and electrical from damage and blockage.

1.5 Disposal of wastes

- .1 Do not bury or burn rubbish or waste materials.

- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly work progresses.

Part 2 Products - Not Used

Part 3 Execution

3.1 (CWM plan) implementation

- .1 **Manager:** Contractor is responsible for designating an on site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.
- .2 **Distribution:** Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Departmental Representative and other site personnel as required to maintain CWM Plan.
- .3 **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.

End of Section

Part 1 General

1.1 Administrative requirements

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: Tested, adjusted, balanced, and fully operational.
 - .4 Certificates: supply all certificated submitted as required by Code, Parks Canada Fire protection services, and Utility companies
 - .5 Operation of systems: Demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
 - .7 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work is incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

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: Remove waste materials in accordance with Section 01 74 19 - Waste management and disposal.

Lower Fort Garry - Rehabilitation
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Rehabilitation from Water Damage – Lower Fort
Garry National Historic Site

SECTION 01 77 00
Closeout procedures
Page 2 of 2

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Administrative requirements

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

1.2 Action and informational submittals

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

1.3 Format

- .1 Organize data as instructional manual.
- .2 Binders: 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, contract # and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD or DVD.

- .10 Provide high resolution digital photos in .jpg or .tiff format on CD/ DVD or Flash Drive. Refer to Section 01 33 00 Submittal Procedures.

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 Departmental Representative 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. Include applicable MSDS / SDS / PSDS data sheets.
- .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.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 As -built documents and samples

- .1 Maintain, in addition to requirements in General Conditions, one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.
- .6 Submit as-built drawings to Departmental Representative.
 - .1 Provide in electronic form as CAD dwg format, on CD or DVD.

1.6 Recording information on project record documents

- .1 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .2 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Field changes of dimension and detail.
 - .2 Changes made by change orders.
 - .3 Details not on original Contract Drawings.
 - .4 Referenced Standards to related shop drawings and modifications.
- .3 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.
- .4 Provide digital photos, to the Departmental Representative for site records. Refer to Section 01 33 00 - Submittal Procedures for requirements, format and submission method.
- .5 At substantial completion of project and prior to final inspection, submit as-built drawings and project manual to Departmental Representative.
 - .1 Departmental Representative will review and initial, to concur with content of the final mark-ups.

1.7 Equipment and systems

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

- .11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS.
- .15 Additional requirements: as specified in individual specification sections.

1.8 Materials and finishes

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

1.9 Delivery, storage and handling

- .1 Provide spare parts, in quantities specified in individual specification sections. Provide items of same manufacture and quality as items in work.
- .2 Store spare parts, maintenance materials, and special tools in manner to prevent damage, deterioration or theft.
- .3 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .4 Store components subject to damage from weather in weatherproof enclosures.
- .5 Store paints and freezable materials in a heated and ventilated room.
- .6 Remove and replace damaged products at own expense and for review by Departmental Representative.
- .7 Obtain receipt for delivered products and submit prior to final payment.

1.10 Warranties and bonds

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct 4, 9, and 12 month warranty inspections, measured from time of acceptance, by Departmental Representative.
- .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 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.
 - .3 Contractor's plans for attendance at 4, 9, and 12 month post-construction warranty inspections.
 - .4 Procedure and status of tagging of equipment covered by extended warranties.
 - .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.11 Operations and Maintenance Manual Checklist

- .1 Operations and Maintenance Manual requirements
- .2 The contractor shall compile O&M manuals as required by the project specifications with the following format:
 - .1 Assembled in 1" or greater, 3 ring binders and one electronic copy provided on Memory Stick (or appropriate electronic media).
 - .2 1 hard copy binders and 1 Memory Device/Thumb Drive copy of Operations and Maintenance (O&M) Manuals are required upon project completion. O and M Manuals are to be assembled in a 1" or greater 3 ring binder labelled on the front cover and on the binder edge with the: Building Name and address, project name, project number, completed date (ex. October 2016).
- .3 Contents of the Operations and Maintenance Manual:
 - .1 Binder Cover and Binder Edge and Title Page:
 - .1 Project Name, Building Name, address, project number, Project Completion Date.
 - .2 Table of Contents:
 - .1 Project Name, Building Name, address, project number, Project Completion Date and table of contents.
 - .3 Tab A - Contact Information:
 - .1 Include contact information for Consultant, General Contractor and all Sub-Contractors. Contractor Information: name, address, telephone number of manufacturer, installing contractor, 24-hour number for emergency service for all equipment in this section identified by equipment.
 - .4 Tab B - Signed Letter of Warranty
 - .1 Signed and dated letter of Warranty to include: project name, project number, location, warranty start date (to be the date of Substantial Completion as declared by Consultant), and all manufacturer and extended warranties.
 - .5 Tab C - Shop Drawings:
 - .1 A copy of all start up reports, completed performance verification forms and permits or certification from Authorities Having Jurisdiction.
 - .6 Tab D - All Reports:
 - .1 Copies of all reports from Authorities Having Jurisdictions.
 - .7 Tab E - Sequence of Operation:

- .1 Provide Designers and / or Manufactures operating instructions and sequence of operations.
- .8 Tab F - Maintenance and Service Procedures:
 - .1 Specific service and maintenance manuals, preventative and corrective maintenance, with service procedures and schedules.
- .9 Tab G - As Built Drawings:
 - .1 Marked in red ink, by the Contractor and reviewed by the Consultant.
- .10 Tab H - CMMS Data Sheets:
 - .1 A copy of all completed CMMS Data Sheets for all equipment which was deleted, removed, added or replaced.
- .11 Tab I - Site Inspection Reports:
 - .1 This will be provided by the consultant and included in the O&M submission.
 - .2 Inspection report(s) conducted during the implementation of the project.
- .12 Tab J - Final Commissioning Manual:
 - .1 This will be provided by the consultant and included in the O&M submission.
 - .2 Narrative of commissioning activities and challenges that occurred during each phase of the project. Confirmation letter identifying that all performance verification tests have met the requirements of the specifications document, basis of design (if applicable) and requirements of the project.

Part 2 Products - Not Used

Part 3 Execution - Not Used

End of Section

Part 1 General

1.1 Trainees

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

1.2 Instructors

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

1.3 Training objectives

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

1.4 Training materials

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

- .5 Supplement training materials:
 - .1 Handouts, photographs, or diagrams.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.5 Scheduling

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver comprehensive training at the satisfaction of the Departmental Representative during regular working hours, training sessions to be 3 hours in length and to include time for questions and if necessary follow up questions and emails.
- .3 Training to be completed prior to acceptance of facility.

1.6 Responsibilities

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

1.7 Training content

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
 - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
 - .7 Maintenance and servicing.
 - .8 Trouble-shooting diagnosis.
 - .9 Interaction among systems during integrated operation.
 - .10 Review of O&M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

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 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the Operations and Maintenance Manual
 - .3 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional, operational requirements and construction document.

1.2 Acronyms:

- .1 Cx - Commissioning.
- .2 BMM - Building Management Manual.
- .3 EMCS - Energy Monitoring and Control Systems.
- .4 WHMIS Safety Data Sheets (SDS/ MSDS / PSDS).
- .5 PI - Product Information.
- .6 PV - Performance Verification.
- .7 TAB - Testing, Adjusting and Balancing.
- .8 WHMIS - Workplace Hazardous Materials Information System.

1.3 Commissioning overview

- .1 Section 01 91 13.13 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 13.13 - Commissioning (Cx) Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional

and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.

- .6 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components, systems and integrated systems have been fully commissioned and functional as per design intent to meet contract specification and project functional and operational requirements.
 - .3 Completion of one O&M Training session to Operational and Maintenance staffs.
 - .4 Final O&M and training manual to be received, reviewed and approved by Departmental Representative for suitability.
 - .5 Successful completion of integrated system tests, and after meeting all requirements of the authority having jurisdiction.

1.4 Non-conformance to performance verification requirements

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

1.5 Pre-cx review

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

- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.6 Conflicts

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

1.7 Action and informational submittals

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
 - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
 - .3 Cx procedures are to be created by the Departmental Representative, and provided to the contractor for execution, including Departmental witness of commissioning activities.
 - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.8 Commissioning documentation

- .1 Refer to Section 01 91 13.16 - Commissioning (Cx) Forms.
- .2 Departmental Representative to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

1.9 Commissioning schedule

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.19 - Construction Progress Schedules - Bar (GANTT) Chart.
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.10 Commissioning meetings

- .1 Commissioning meetings to be convened by the Departmental Representative, who will also records minutes and distribute to all parties within 28 hours, contractor(s) are responsible for attending and participating in commissioning meetings, as well as executing commissioning plan (prepared by the Departmental Representative) and completing the commissioning inspections and testing (which is created by the Departmental Representative)

- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60 % construction completion stage. Section 01 32 16.19 - Construction Progress Schedules - Bar (GANTT) Chart. Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60 % and subsequent Cx meetings and as required.

1.11 Starting and testing

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

1.12 Witnessing of starting and testing

- .1 Provide 14 days notice prior to commencement.
- .2 Departmental Representative to witness 100% of start-up and testing.
- .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 Manufacturer's involvement

- .1 Factory testing: manufacturer to:
 - .1 Coordinate time and location of testing.
 - .2 Provide testing documentation for approval by Departmental Representative.
 - .3 Arrange for Departmental Representative to witness tests.
 - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.
- .2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative
 - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .3 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.

- .2 Verify with manufacturer that testing as specified will not void warranties.
- .4 Qualifications of manufacturer's personnel:
 - .1 Experienced in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.14 Procedures

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

1.15 Start-up documentation

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,

- .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

1.16 Operation and maintenance of equipment and systems

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

1.17 Test results

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

1.18 Start of commissioning

- .1 Notify Departmental Representative at least 21 days prior to start of Cx.

1.19 Instruments/equipment

- .1 Submit to Departmental Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

1.20 Commissioning performance verification

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

1.21 Witnessing commissioning

- .1 Departmental Representative to witness activities and verify results.

1.22 Authorities having jurisdiction

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

1.23 Extent of verification

- .1 100% verification of all equipment installed is required on this project.
- .2 Number and location to be at discretion of Departmental Representative.
- .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
- .4 Review and repeat commissioning of systems if inconsistencies found in more than 20 % of reported results.
- .5 Perform additional commissioning until results are acceptable to Departmental Representative.

1.24 Repeat verifications

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

1.25 Sundry checks and adjustments

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

1.26 Deficiencies, faults, defects

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

1.27 Completion of commissioning

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.28 Activities upon completion of commissioning

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

1.29 Training

- .1 In accordance with Section 01 79 00 - Commissioning (Cx) - Training and 01 79 00.13 Demonstration and Training for Building Commissioning.

1.30 Maintenance materials, spare parts, special tools

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

1.31 Occupancy

- .1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.32 Performance verification tolerances

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10 % of specified values.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.33 Departmental Representative's performance testing

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

Part 2 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 Underwriters' Laboratories of Canada (ULC)
- .2 ASHRAE 202-2013 - Commissioning Process for Building and Systems
- .3 CSA Z320-11 - Building commissioning Standard.
- .4 CAN/ULC-S1001-11-R2018 "Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems"

1.2 General

- .1 Provide a fully functional facility :
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term "Cx" in this section means "Commissioning".
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet design requirements.
 - .5 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .4 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.3 Development of 100% cx plan

- .1 Cx Plan to be 95% completed before added into Project Specifications.
- .2 Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.

- .4 Cx schedule.
- .5 Contractor's, sub-contractor's, suppliers' requirements.
- .6 Project construction team's and Cx team's requirements.
- .3 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.4 Refinement of cx plan

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

1.5 Composition, roles and responsibilities of cx team

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 Project Manager will select Cx Team consisting of following members:
 - .1 Departmental Representative Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress
 - .2 Departmental Representative Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
 - .1 Review of Cx documentation from operational perspective.
 - .2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
 - .3 Protection of health, safety and comfort of occupants and O&M personnel.
 - .4 Monitoring of Cx activities, training, development of Cx documentation.
 - .5 Work closely with members of Cx Team.
 - .3 Departmental Representative is responsible for:
 - .1 Organizing Cx.
 - .2 Monitoring operations Cx activities.
 - .3 Witnessing, certifying accuracy of reported results.
 - .4 Witnessing and certifying TAB and other tests.
 - .5 Developing BMM.
 - .6 Ensuring implementation of final Cx Plan.
 - .7 Performing verification of performance of installed systems and equipment.
 - .8 Implementation of Training Plan.

- .4 Construction Team: contractor, subcontractors, suppliers and support disciplines, is responsible for construction/installation in accordance with Contract Documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
- .5 Contractor's Cx agent implements specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.
 - .3 Testing.
 - .4 Preparation, submission of test reports.
- .6 Technical Services Advisor: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility.

1.6 Cx participants

- .1 Employ the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
 - .4 Specialist Cx agency:
 - .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
 - .5 Client: responsible for intrusion and access security systems.
 - .6 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.
 - .7 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

1.7 Extent of cx

- .1 Commission mechanical systems and associated equipment:
 - .1 Fire and life safety systems:
 - .1 Nitrogen Generator
 - .2 Fire Alarm and detection system

- .3 Sprinkler system
- .2 Commission electrical systems and equipment
- .3 Commission fire alarm systems and equipment

1.8 Deliverables relating to O&M perspectives

- .1 General requirements:
 - .1 Compile English documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 WHMIS Safety Data Sheets (SDS).
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.
 - .8 Contractor's and sub-contractors' as built drawings.
 - .9 Standard Operating Procedures (SOP)
 - .10 Preventive Maintenance Program

1.9 Deliverables relating to the CX process

- .1 General:
 - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
 - .1 Cx Specifications.
 - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .3 Completed installation checklists (ICL).
 - .4 Completed product information (PI) report forms.
 - .5 Completed performance verification (PV) report forms.
 - .6 Results of Performance Verification Tests and Inspections.
 - .7 Description of Cx activities and documentation.
 - .8 Description of Cx of integrated systems and documentation.
 - .9 Preventive maintenance program

- .10 Tests performed by Contractor.
- .11 Training Plans.
- .12 Cx Reports.
- .13 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.
- .5 Departmental Representative to participate.

1.10 Pre-cx activities and related documentation

- .1 Items listed in this Cx Plan include the following:
 - .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative satisfaction.
 - .2 Departmental Representative to use approved check lists.
 - .3 Departmental Representative will monitor all of these pre-start-up inspections.
 - .4 Include completed documentation with Cx report.
 - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
 - .6 Departmental Representative will monitor some of these inspections and tests.
 - .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - ELECTRICAL:
 - .1 Fire alarm systems: test after other safety and security systems are completed. Testing to include a complete verification in accordance with CAN/ULC-S537-2019 "Standard for Verification of Fire Alarm Systems" requirements.
 - .2 Low voltage systems: these include:
 - .1 Clock, communications, low voltage lighting control systems and data communications systems.

1.11 Start-up

- .1 Start up components, equipment and systems.
- .2 Departmental Representative to monitor all of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .3 Performance Verification (PV):
 - .1 Approved Cx Agent to perform.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.
 - .2 Departmental Representative to witness and certify reported results using approved PI and PV forms.
 - .3 Departmental Representative to approve completed PV reports and provide to Departmental Representative.

1.12 Cx activities and related documentation

- .1 Perform Cx by specified Cx agency using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Departmental Representative to monitor Cx activities.
- .3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
- .4 Departmental Representative to witness, certify reported results of, Cx activities and forward to Departmental Representative.
- .5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.13 Installation check lists (icl)

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

1.14 Product information (pi) report forms

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

1.15 Performance verification (pv) report

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

1.16 Cx schedules

- .1 Prepare detailed critical path Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Design criteria, design intents.
 - .2 Cx agents' credentials: 60 days before start of Cx.
 - .3 Cx procedures: 1 months after award of contract.
 - .4 Cx Report format: 1 months after contract award.
 - .5 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 - .6 Notification of intention to start Cx: 14 days before start of Cx.
 - .7 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
 - .8 Identification of deferred Cx.
 - .9 Implementation of training plans.
 - .10 Cx reports: immediately upon successful completion of Cx.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.

- .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.

1.17 Cx reports

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

1.18 Training plans

- .1 Refer to Section 01 79 00 - Demonstration and Training.

1.19 Final settings

- .1 Upon completion of Cx to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

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/start-up check lists

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

1.2 Product information (PI) report forms

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

1.3 Performance verification (PV) forms

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

1.4 Samples of commissioning forms

- .1 Departmental Representative's will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.
- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

1.5 Changes and development of new report forms

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

1.6 Commissioning forms

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Contractor to provide commissioning forms based on sample commissioning forms, attached to this section, upon Departmental Representative's request.
- .3 Strategy for Use:
 - .1 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .2 Confirm operation as per design criteria and intent.
 - .3 Identify variances between design and operation and reasons for variances.
 - .4 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .5 Record analytical and substantiating data.
 - .6 Verify reported results.
 - .7 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.
 - .8 Submit immediately after tests are performed.
 - .9 Reported results in true measured SI unit values.
 - .10 Provide Departmental Representative with originals of completed forms.
 - .11 Maintain copy on site during start-up, testing and commissioning period.

1.7 Language

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

Part 2 Products

2.1 Not used

- .1 Not Used.

Part 3 Execution

3.1 Not used

- .1 Not Used.

End of Section

FIRE ALARM SYSTEM

Start-Up



Sample

COMPANY: _____

 ADDRESS: _____

CUSTOMER: PARKS CANADA
 Rehabilitation from Water Damage
 PROJECT: - Lower Fort Garry National
 Historic Site
 FILE NUMBER: 5P468
 DATE: _____

FIRE ALARM INDICATOR	STATUS	COMMENTS
FIRE ALARM DEVICES INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS		
FIRE ALARM CONNECTIONS INSTALLED AS PER THE SEALED DRAWINGS		
ALL FIRE ALARM DEVICES HAVE IDENTIFYING LABELS		

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

FIRE ALARM SYSTEM

Functional Performance Testing



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
Rehabilitation from Water
PROJECT: Damage
- Lower Fort Garry National
FILE NUMBER: 5P468
DATE: _____

FIRE ALARM INDICATOR	STATUS	COMMENTS
FIRE ALARM VERIFICATION PASSED		
FIRE ALARM RESPONDS TO EACH INDIVIDUAL SENSOR		
FIRE ALARM RESPONDS TO SYSTEM ACTIVATION		
FIRE ALARM RESPONDS TO LOW PRESSURE		

GENERAL COMMENTS: 		
POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

SPRINKLER SYSTEM

Static Verification



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
PROJECT: Rehabilitation from Water Damage
- Lower Fort Garry Historic Site
FILE NUMBER: 5P468
DATE: _____

SPRINKLER HEAD LOCATION	SPECIFIED	SHOP DRAWINGS	INSTALLED
BIG HOUSE BASEMENT	DRY TYPE PENDENT		
BIG HOUSE MAIN FLOOR	DRY TYPE CONCEALED		
BIG HOUSE ATTIC	DRY TYPE ATTIC		
MENS HOUSE MAIN FLOOR	DRY TYPE PENDENT		
MENS HOUSE ATTIC	DRY TYPE UPRIGHT		
MENS HOUSE ATTIC	DRY TYPE ATTIC		
FURLOFT BASEMENT	DRY TYPE UPRIGHT		
FURLOFT BASEMENT	DRY TYPE UPRIGHT - HIGH TEMPERATURE		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

SPRINKLER SYSTEM

Start-Up-2



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
PROJECT: Rehabilitation from Water Damage
- Lower Fort Garry Historic Site
FILE NUMBER: 5P468
DATE: _____

NAMEPLATE

BUILDING	
----------	--

FUNCTIONAL PERFORMANCE TESTING**STATUS****COMMENTS**

FUNCTIONAL PERFORMANCE TESTING	STATUS	COMMENTS
AIR PRESSURE TEST AS PER NFPA		
STARTING PRESSURE		
ENDING PRESSURE		
TIME		
LEAKAGES		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

SPRINKLER SYSTEM - LOW POINT DRAIN

Start-Up-3



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
PROJECT: Rehabilitation from Water Damage
- Lower Fort Garry Historic Site
FILE NUMBER: 5P468
DATE: _____

LOW POINT DRAIN	STATUS	COMMENTS
DRAIN SET PROPERLY		
DRAIN SLOPED AT MINIMUM 15%		
DRAIN THREADED PROPERLY		
DRAIN INSTALLED AS PER DRAWINGS		
DRAIN CONFORMS WITH NFPA		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

NITROGEN GENERATOR SYSTEM

Static Verification



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
PROJECT: Rehabilitation from Water Damage
- Lower Fort Garry Historic Site
FILE NUMBER: 5P468
DATE: _____

NAMEPLATE

EQUIPMENT TAG	LOCATION

NITROGEN GENERATOR SYSTEM	SPECIFIED	SHOP DRAWINGS	INSTALLED
MANUFACTURER	POTTER		
MODEL NO.	INS-250		
SERIAL NO.	NOT PROVIDED	NOT PROVIDED	
MINIMUM SPRINKLER CAPACITY	300 GALLONS		
NITROGEN TANK	10 GALLONS		
CONTROLLER	INTELLUGEN CONTROLLER		
INTERNAL COMPRESSOR	1/2 HP OIL-LESS		
NITROGEN GENERATOR MOUNTING	WALL MOUNTED		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

NITROGEN GENERATOR SYSTEM

Start-Up



Sample

NAME: _____
 COMPANY: _____
 ADDRESS: _____

CUSTOMER: PARKS CANADA
 PROJECT: Rehabilitation from Water Damage
 - Lower Fort Garry Historic Site
 FILE NUMBER: 5P468
 DATE: _____

NAMEPLATE

EQUIPMENT TAG	LOCATION

START-UP	STATUS	COMMENTS
INSTALLED AS PER MANUFACTURER SPECIFICATIONS		
INSTALLED AS PER MECHANICAL PLANS		
MANUFACTURER STARTUP CHECKLIST COMPLETED		
UNIT CORRECTLY SUPPORTED		
ELECTRICAL CONNECTIONS PROVIDED		
UNIT PIPING IS CORRECTLY INSTALLED		
NO HOLES IN THE UNIT, I.E. MISSING SCREWS OR CAP		
ACCESS DOORS CLOSE TIGHTLY, AND OPEN EASILY		
UNIT CONTROL WIRED CORRECTLY		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

NITROGEN GENERATOR SYSTEM

Functional Performance Testing



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
PROJECT: Rehabilitation from Water Damage
- Lower Fort Garry Historic Site
FILE NUMBER: 5P468
DATE: _____

NAMEPLATE

EQUIPMENT TAG	LOCATION

FUNCTIONAL PERFORMANCE TESTING	STATUS	COMMENTS
UNIT RESPONDS TO A CALL FOR NITROGEN		
UNIT FILLS SPRINKELR SYSTEM IN UNDER 30 MINUTES		
UNIT MAINTAINS 98% NITROGEN PURITY		
EXCESSIVE NOISE PRESENT		
EXCESSIVE VIBRATION PRESENT		
EXCESSIVE HEAT FROM UNIT		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

CHECK VALVE

Start-Up



Sample

NAME: _____
COMPANY: _____
ADDRESS: _____

CUSTOMER: PARKS CANADA
Rehabilitation from Water Damage
PROJECT: - Lower Fort Garry National Historic Site
FILE NUMBER: 5P468
DATE: _____

NAMEPLATE

EQUIPMENT NO.	
LOCATION	

START-UP	STATUS	COMMENTS
MANUFACTURER START-UP DOCUMENTATION COMPLETED		
SERVICE SPACE PROVIDED AROUND VALVE		
CHECK FLOW DIRECTION		
CHECK THREADS FOR DAMAGE		
CHECK ALL EXTERNAL MECHANICAL COMPONENTS FOR TIGHTNESS		
INSTALLED AS PER MANUFACTURER'S INSTRUCTIONS		
CHECK FOR MATING RESISTANCE BETWEEN HOSE AND VALVE		

GENERAL COMMENTS:

--

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

CHECK VALVE
Functional Performance Testing



Sample

NAME: _____
 COMPANY: _____
 ADDRESS: _____

CUSTOMER: PARKS CANADA
 Rehabilitation from Water Damage -
 PROJECT: Lower Fort Garry National Historic
 Site
 FILE NUMBER: 5P468
 DATE: _____

NAMEPLATE	
EQUIPMENT NO.	
LOCATION	

FUNCTIONAL PERFORMANCE TESTING	VALUE	COMMENTS
INSPECT FOR LEAKS AT SYSTEM PRESSURE PER 13.4.1		
VALVE STATUS TEST		
PREVENTS BACKFLOW		
ENSURE THAT THERE IS NO LEAKAGE WHILE VALVE IS IN CLOSED POSITION		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Cx Authority/ Commissioning Provider		
Design Consultants		
Contractors/Subcontractor		

Part 1 General

1.1 Reference standards

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (SDS / MSDS / PSDS).
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA13-2019, Standard for the Installation of Sprinkler Systems.

1.2 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings.
- .4 Quality control submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
 - .2 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.
- .5 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 Delivery, storage and handling

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

Part 2 Products

2.1 Heat Trace for Fire Protection Piping

- .1 Heat Trace:
 - .1 Length: 6 meters
 - .2 Rated for incoming feed mains for a fire protection system.
 - .3 Minimum required heat capacity: 33 W/m
 - .4 Electric supervision of the heat tracing system shall provide confirmation that the circuit is energized. This shall be supervised by the Fire Alarm System (See Section 28 31 00.01)
- .2 Controller: For heat tracing of fire protection piping
 - .1 c-UL listed with built-in ground fault protection functionality
 - .2 Temperature setting: 4.5 C

- .3 Electrical requirement: 120 V, 24 A

2.2 Temperature Switch for Fire Alarm

- .1 Room Temperature Switch
 - .1 Set Temperature: 4.5 C
 - .2 Room temperature switch to be able to be interconnected with and be monitored by the fire alarm and detection system.

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 heat trace as indicated.

3.3 Field quality control

- .1 Manufacturer's Field Services:
 - .1 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.

End of Section

Part 1 General

1.1 Reference standards

- .1 National Fire Protection Association (NFPA).
- .2 Underwriter's Laboratories of Canada (ULC).

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 specified equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.

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 fire suppression system for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .3 Maintenance data to include:

- .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
- .2 Data to include schedules of tasks, frequency, tools required and task time.
- .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
 - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-Built drawings:
 - .1 Prior to fire suppression system testing, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Departmental Representative for approval and make corrections as directed.
 - .4 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.4 Maintenance material submittals

- .1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

1.5 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect all equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products - Not Used

Part 3 Execution

3.1 Examination

- .1 Verification of Conditions: verify that conditions of system previously installed under other Sections or Contracts are acceptable for the new 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 Field quality control

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

3.3 Demonstration

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Departmental Representative reserves the right to record for future reference.

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

End of Section

Part 1 General

1.1 Reference standards

- .1 National Fire Protection Association (NFPA)
 - .1 NFPA13-2019, Standard for the Installation of Sprinkler Systems.
 - .2 NFPA 25-2020, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN4 S543-M1984, Standard for Internal Lug Quick Connect Coupling for Fire Hose.

1.2 Action and informational submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets for equipment and systems, applicable series designation or style and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Test reports:
 - .1 Test hydrostatically to meet requirements of fire protection system to which it will be connected.
 - .2 Test Nitrogen Generator to demonstrate compliance with NFPA and specification. Submit test results for approval of the Departmental Representative.
- .5 Certificates:
 - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties, including:
 - .1 Contractor's Material and Test Certificate for Aboveground Piping
 - .2 Nitrogen System - Start-up/ Commissioning Report.
- .6 Manufacturers' Instructions:
 - .1 Instructions: provide manufacturer's installation instructions.
- .7 Field Quality Control Submittals:
 - .1 Manufacturer's Field Reports: submit manufacturer's field reports specified.

1.3 Closeout submittals

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

1.4 Quality assurance

- .1 Qualifications

- .1 The sprinkler system contractor must have a minimum of five (5) years' experience in Sprinkler System Installation.
 - .2 All work shall be carried out by Sprinkler Fitters who carry a "Certificate of Qualification" for this trade as issued by the Province of Manitoba.
 - .3 All Sprinkler Pipe Fitters shall have manufacturer training or demonstrated experience in proper use of grooving tools, application of groove and installation of grooved piping products for stainless steel applications.
- .2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

1.5 Maintenance material submittals

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

1.6 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions
- .3 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 Pipe, fittings and valves

- .1 Pipe: (Above Ground)
 - .1 NPS 2 and less:
 - .1 Black steel, painted, Schedule 40, threaded, ULC listed or cUL certified for fire protection, and complying with NFPA 13 and ASTM A-53 Standards.
 - .2 NPS 2 ½ and over:
 - .1 Black steel, painted Schedule 40, roll grooved, ULC listed or cUL certified for fire protection, and complying with NFPA 13 and ASTM A-53 Standards.
- .2 Fittings and joints to NFPA 13:
 - .1 Ferrous: roll grooved.
 - .1 Grooved joints designed with two ductile iron housing segments, flush seal gasket for dry service, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.
- .3 Auxiliary valves:
 - .1 ULC listed for fire protection service.

- .2 Up to NPS 2: bronze, screwed ends, grooved, OS & Y gate.
- .3 NPS 2 1/2 and over: cast or ductile iron, flanged or roll grooved ends, indicating butterfly valve.
- .4 Swing or spring-actuated check valves.
- .5 Ball drip.
- .6 Tamper devices wired back to fire alarm panel.
- .4 Pipe hangers:
 - .1 ULC listed for fire protection services.

2.2 Sprinklers

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 As indicated on the drawings. Replacements are to match the existing type unless otherwise noted. Dry pendant sprinkler barrel lengths are to be confirmed on site after all hanger adjustments are made.

2.3 Nitrogen Generation and Corrosion Inhibiting System

- .1 Complete packaged system consisting of:
 - .1 Nitrogen generation system
 - .2 Auto-purge system
 - .3 Leak detection system
 - .4 Supervisory gas monitoring system
 - .5 Manufacturer's site commissioning
- .2 Package and components to be ULc listed or cUL certified for use with fire protection systems.
- .3 Nitrogen Generation System:
 - .1 To provide supervisory pressure between 0-60 PSI.
 - .2 System to be floor mounted and to include an integral air compressor located with unit.
 - .1 Air compressor to be oil-less and provide clean, dry, oil-free compressed air to the nitrogen system.
 - .3 Automatic air compressor, quiet type, electric drive, tank mounted, single stage compressor, belt guard and controls, built-in to the nitrogen generation system.
 - .4 Capacity:
 - .1 To restore normal air pressure in system within 30 minutes for 300 gallon system at 40 psi.
 - .2 To provide air pressure of 140 kPa in excess of calculated trip pressure of dry pipe valve and in accordance with instruction sheet provided with dry pipe valve.
 - .5 Generator to be capable of producing 98% + purity nitrogen.
 - .6 Power requirements
 - .1 As required for capacity - 745.7 kW maximum
 - .2 Dedicated 20 A circuit, 120 VAC
 - .7 Size restrictions

- .1 The existing generator and air tank system dimensions are as follows: Height - 1353mm, Width - 700mm, Length - 991mm. The new system must be smaller than the existing system or it must be confirmed that it can fit on site.
- .8 Nitrogen storage tank: Minimum capacity to handle up to 300 gallons of total sprinkler system capacity, ASME rated for 1,034 kPa, "on/off" valve, ½" NPT fitting, complete with ASME rated 689 kPa safety relief valve.
 - .1 Tank automatic drain valve
- .9 Acceptable products:
 - .1 Potter: IntelliGen Nitrogen Generator (INS)
 - .2 Minimum sprinkler pipe capacity: 300 gallons
 - .3 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
- .4 Hour Meter
 - .1 AC electrical connection
 - .2 1/100th runtime recording.
- .5 Manual Self-Purging Valve Kit:
 - .1 Pneumatic system (no AC or DC electrical connections) to ensure continuous cycling of nitrogen through the system.
 - .2 Complete with auto high-pressure water shut-off and adjustable auto-purge orifice.
 - .3 Quick-connect connections test port for use with nitrogen purity sensor or provide additional sampling port adjacent to auto-purge system.
 - .4 Acceptable products:
 - .1 Potter, Model NGP-SPV.
 - .2 Replacement materials or products: Approved by addendum according to Instructions to Bidders.
- .6 Leak Detection System:
 - .1 Integral leak detection system to alarm if a significant leak occurs in system prior to supervisory pressure falling below specified pressure.
 - .2 Integral system must also indicate if there is a failure with the nitrogen generation system or its integral air compressor.
- .7 Sampling Ports
 - .1 Provide sampling ports as indicated on drawings.
 - .2 Includes isolation valve and quick-connect fitting compatible with portable nitrogen purity sensor.
- .8 Portable Nitrogen Purity Monitoring Sensor:
 - .1 Provide two monitoring devices. One will be held as spare.
 - .2 Portable hand-held nitrogen purity sensor.
 - .3 Battery-operated.
 - .4 Manually connected to designated system test locations.
 - .5 Quick-connect connections test ports, as indicated, for use with supplied sensor

- .9 Existing nitrogen generator in Men's house, Big House and Furloft is to participate in Potter's buy back program. Contact Johnson Controls Canada LP for Potter Buy-back program.

2.4 Spare parts cabinet

- .1 Provide six sprinkler heads, with at least two models of each sprinkler type inside a "Spare" box cabinet. Sprinkler types are indicated on the drawings.
- .2 A list of sprinklers installed in the facility is to be posted by the sprinkler cabinet.
- .3 Cabinet for maintenance material, special tools, and spare sprinkler, including sprinkler wrench. Cabinet must be installed near alarm check valves.
- .4 Cabinet must be constructed as per sprinkler system manufacturer's standards.

2.5 Identification

- .1 Bilingual indicating plates for test/drain valves: To NFPA 13 Standard.
- .2 The installing contractor must identify a hydraulically designed sprinkler system with a permanently marked weatherproof metal or rigid plastic sign secured with corrosion resistant wire, chain, or other approved means.
- .3 Provide and install at the base of riser in a permanent manner hydraulic design information sign, including the following information:
 - .1 Location of the design area or areas;
 - .2 Size (area) of or number of sprinklers in the design area;
 - .3 Discharge densities over the design area or areas;
 - .4 Required flow and residual pressure demand at the base of the riser or fire pump, where applicable;
 - .5 Occupancy classification;
 - .6 Hose stream allowance included in addition to the sprinkler demand;
 - .7 Name of the installing contractor.
- .4 Fire protection equipment identification to NFPA 170, Standard for Fire Safety and Emergency Symbols.

Part 3 Execution

3.1 Manufacturer's instructions

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

3.2 Installation

- .1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.
- .2 Testing to be witnessed by Departmental Representative.
- .3 Provide "Contractors Material Test Certificate" as per ANSI/NFPA 13 Standard for insertion in O&M Manual.
- .4 Execute installation in accordance with established Standards and Laws, Regulations and current Codes, and Standards requirements.

- .5 Proper operation and installation coordination of the system, including automatic sprinkler system, system's monitoring points as well as the systems commissioning, are all under the fire protection Contractor's responsibility.
- .6 Connect the nitrogen generator system to the dry pipe system.
- .7 Clearly identify main shut-off valves, drain valves, by-pass valves, and all auxiliary valves.
- .8 Install the piping for the dry pipe system with a slope for drainage towards the system lowest point. Consider slope as indicated on drawings. When slope is not indicated on the drawing, consider slope of 4% (40 mm/m).
- .9 Provide the lowest points of the dry pipe system with adequate drainage devices, in accordance with NFPA 13.
- .10 Install hydraulic design information signs on the riser, near alarm check valves.
- .11 Drain the network at the end of the tests.

3.3 Nitrogen Generation System

- .1 Manufacturer's Site Commissioning Services:
 - .1 Provide site commissioning by manufacturer for nitrogen generation system

3.4 Field quality control

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.5 Cleaning

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section

Part 1 General

1.1 Reference standards

- .1 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-19, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S526-16, Visible Signal Devices for Fire Alarm Systems, Including Accessories.
 - .3 CAN/ULC-S527-19, Standard for Control Units for Fire Alarm Systems.
 - .4 CAN/ULC-S528-14, Manual Stations for Fire Alarm Systems, Including Accessories.
 - .5 CAN/ULC-S529-16, Smoke Detectors for Fire Alarm Systems.
 - .6 CAN/ULC-S530-18, Heat Actuated Fire Detectors for Fire Alarm Systems.
 - .7 CAN/ULC-S531-02, Standard for Smoke Alarms.
 - .8 CAN/ULC-S537-19, Standard for the Verification of Fire Alarm Systems.

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 multiplex fire alarm system and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada for approval by Departmental Representative prior to commencing repairs.

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 fire alarm system for incorporation into manual.
- .3 Include:
 - .1 Instructions for complete fire alarm system to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
 - .4 List of recommended spare parts for system.

1.4 Maintenance material submittals

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

1.5 Delivery, storage and handling

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 Description

- .1 Fully supervised, microprocessor-based, fire alarm system, utilizing digital techniques for data control and digital, and multiplexing techniques for data transmission.
- .2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to monitoring agency.
- .3 Zoned, single stage.
- .4 Modular in design to allow for future expansion.
- .5 Operation of system shall not require personnel with special computer skills.
- .6 System to include:
 - .1 Central Control Unit in separate enclosure with power supply, stand-by batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.
 - .2 Data Gathering Panels/Transponders with stand-alone capabilities.
 - .3 Power supplies.
 - .4 Initiating/input circuits.
 - .5 Output circuits.
 - .6 Auxiliary circuits.
 - .7 Wiring.
 - .8 Manual and automatic initiating devices.
 - .9 Audible and visual signalling devices.
 - .10 End-of-line resistors.
 - .11 Low temperature sensors.
- .7 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .8 Power supply: to CAN/ULC-S524.
- .9 Audible signal devices: to CAN/ULC-S524.
- .10 Visual signal devices: to CAN/ULC-S526.
- .11 Control unit: to CAN/ULC-S527.

- .12 Thermal detectors: to CAN/ULC-S530.
- .13 Regulatory Requirements:
 - .1 Subject to FC inspection for final acceptance.

2.2 System operation: single stage - signals only

- .1 Actuation of any alarm initiating device to:
 - .1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.
 - .2 Indicate zone of alarm at central control unit display and remote annunciator.
 - .3 Cause audible signalling devices to sound continuously throughout building and at central control unit.
 - .4 Transmit signal to fire department via fire alarm demarcation box.
 - .5 Cause ventilation system (ERV) to shut down. .
- .2 Acknowledging alarm: indicated at central control unit.
- .3 Actuation of supervisory devices to:
 - .1 Cause electronic latch to lock-in supervisory state at central control unit and data gathering panel/transponder.
 - .2 Indicate respective supervisory zone at central control unit and at remote annunciator.
 - .3 Cause audible signal at central control unit to sound.
 - .4 Activate common supervisory sequence.
- .4 Resetting alarm device not to return system indications/functions back to normal until control unit has been reset.
- .5 Trouble on system to:
 - .1 Indicate circuit in trouble at central control unit.
 - .2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; whereas visual indication to remain until trouble is cleared and system is back to normal.
- .6 Trouble on system: suppressed during course of alarm.
- .7 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 Initiating/input circuits

- .1 Alarm receiving circuits (active and spare): compatible with smoke detectors and open contact devices.
- .2 Actuation of alarm initiating device: cause system to operate as specified in "System Operation".
- .3 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

2.4 Alarm output circuits

- .1 Alarm output circuit: connected to signals, wired in class B configuration to central control unit.

2.5 Auxiliary circuits

- .1 Auxiliary contacts for control functions.
- .2 Actual status indication (positive feedback) from controlled device.
- .3 Alarm trouble on system to cause operation of programmed auxiliary output circuits.
- .4 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.
- .5 Auxiliary circuits: rated at 2 A, 24 Vdc or 120 Vac, fuse-protected.

2.6 Wiring

- .1 Twisted copper conductors: rated 600 V.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.
- .4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

2.7 Automatic alarm initiating devices

- .1 Thermal fire detectors, combination fixed temperature and rate of rise, non-restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57 degrees C, rate of rise 8.3 degrees C per minute.
- .2 Thermal detectors to be designed for moisture proof applications.

2.8 Room Temperature Switch

- .1 Room temperature switch complies with the requirements of NFPA 13 and 72 for a room temperature switch to operate at $4.5^{\circ} \pm 3^{\circ}\text{C}$ to protect a dry pipe valve from freezing.

2.9 End-of-line devices

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

2.10 Fire Alarm Demarcation Box New article

- .1 A locable demarcation terminal box for the interconnection between the fire alarm control panel and the fire alarm transmitter shall have a minimum of 12 terminals to facilitate the electrical supervision of fire alarm, fire trouble, and fire supervision connections.
- .2 The fire alarm demarcation terminal box shall be labeled as " Fire alarm demarcation".

2.11 As-built riser diagram

- .1 Fire alarm system riser diagram: in glazed frame minimum size 600 x 600 mm.

2.12 Ancillary devices

- .1 Remote relay unit to initiate fan shutdown.

Part 3 Execution

3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

- .1 Install systems in accordance with CAN/ULC-S524 -19.
- .2 Install manual alarm stations and connect to alarm circuit wiring.
- .3 Locate and install detectors and connect to alarm circuit wiring. Mount detectors more than 1 m from air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .4 Connect alarm circuits to main control panel.
- .5 Connect signalling circuits to main control panel.
- .6 Install end-of-line devices at end of alarm and signalling circuits.
- .7 Install remote relay units to control fan shut down.
- .8 Sprinkler system: wire alarm and supervisory switches and connect to control panel.
- .9 Connect fire suppression systems to control panel.
- .10 Splices are not permitted.
- .11 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.
- .12 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.
- .13 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.
- .14 Interconnect wiring from the fire alarm control unit to the fire signal receiving centre. This installation shall comply with CAN/ULC-S561, Standard for Installation and Services for Fire Signal Receiving Centres and Systems.
- .15 A demarcation terminal box for the interconnection between the fire alarm control unit and the fire alarm transmitter shall have a minimum of 12 terminals to facilitate the electrical supervision of fire alarm, fire trouble and fire supervisory connections.
- .16 The fire alarm demarcation terminal box shall be labelled "FIRE ALARM DEMARCATION"

3.3 Field quality control

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.

- .2 Fire alarm system:
 - .1 Test such device and alarm circuit to ensure manual stations, sprinkler system transmit alarm to control panel and actuate general alarm.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of systems.
 - .4 Addressable circuits system style DCLA:
 - .1 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals on each side of single open-circuit fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.
 - .2 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.
 - .5 Addressable circuits system style DCLB:
 - .1 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals on line side of single open-circuit fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.
 - .2 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

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 fire alarm system installation.

3.6 Closeout activities

- .1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

End of Section