

Bar U Ranch N.H.S.C. Work Horse Barn Rehabilitation

Longview, Alberta

ISSUED FOR TENDER
SPECIFICATIONS

PROJECT NO. R.083678.001

DATE: NOVEMBER 13, 2019

Parks Canada Agency

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Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 The work of this contract involves the rehabilitation of the Workhorse Barn, a historic log building that is also a Classified Federal Heritage Building, within Bar U Ranch National Historic Site of Canada. Work within this contract is to follow a Heritage Conservation approach described in section 1.2 Heritage Conservation.
- .2 Work includes:
 - .1 Silicone mould with hard shell of the existing North Wall decorative parging,
 - .2 Lifting of the barn and moving of the barn if deemed necessary for new foundation work,
 - .3 New piles and new grade beams complete with salvaged fieldstone foundation assembly,
 - .4 New concrete slab in centre aisle and reinstallation of existing wood floorboards in all other rooms,
 - .5 Various types of historic log and heavy timber repair and replacement including repair of dove tail joints and renewal of chinking and daubing throughout,
 - .6 Repair and replacement of exterior wood siding,
 - .7 Repair of hay loft counterweighted doors and hardware,
 - .8 Interior structural reinforcement and bracing,
 - .9 Modifications to the existing stairs to add a tread and handrail,
 - .10 Cleaning of interior finishes and painting of new finishes,
 - .11 Painting of all exterior finishes,
 - .12 Re-instatement of the Bar U branding graphic on the roof of the barn.
- .3 Due to the Classified Federal Heritage Building status, proper cataloguing, handling, and storage of all building elements is fundamental to the scope of work of this contract. A Protection Plan is to be submitted for approval by Departmental Representative prior to any deconstruction. See 02 42 13.01 – Selective Deconstruction – Removals.

1.2 HERITAGE CONSERVATION

- .1 The heritage conservation approach is to follow the accepted principles and practices described in the Standards and Guidelines for the Conservation of Historic Places in Canada (S&G's). <https://www.historicplaces.ca/media/18072/81468-parks-s+g-eng-web2.pdf>
- .2 Considerations of conservation are guided by a minimal intervention approach and advocate the maintenance and repair of elements instead of their replacement. 10 specific standards will be followed as outlined in the Standards and Guidelines of Historic Places in Canada. The more prominent standards for this project are:
 - .1 #1, Conserve the heritage value of an historic place.
 - .2 #3, Conserve heritage value by adopting an approach calling for minimal intervention.

- .3 #7, Evaluate the existing condition of character-defining elements to determine the appropriate intervention needed. Use the gentlest means possible for any intervention.
- .4 #9, Make any intervention needed to preserve character-defining elements physically and visually compatible with the historic place and identifiable on close inspection. Document any intervention for future reference.
- .5 #10, Repair rather than replace character-defining elements.
- .6 #11 Conserve the heritage value and character-defining elements when creating any new additions to an historic place or any related new construction. Make the new work physically and visually compatible with, subordinate to and distinguishable from the historic place.
- .7 #12 Create any new additions or related new construction so that the essential form and integrity of an historic place will not be impaired if the new work is removed in the future.
- .3 The primary treatment for this conservation project is one of Rehabilitation.
 - .1 Rehabilitation: the action or process of making possible a continuing or compatible contemporary use of an historic place, or an individual component, while protecting its heritage value.
 - .2 Rehabilitation involves the sensitive adaptation of an historic place or individual component for a continuing or compatible contemporary use, while protecting its heritage value.
 - .3 Rehabilitation can include replacing missing historic features.
 - .4 Rehabilitation may be an accurate replica of the missing feature (frames and mullions of windows) or it may be a new design (new foundations) compatible with the style, era and character of the historic place.
- .4 In consideration of Standards #9, #11 and #12, specific measures for the documentation and identification of the new wood to be used in the Workhorse Barn will be carried-out:
 - .1 By the Contractor, on-going photographic documentation must be carried out before, during and after construction. See Section 01 32 33 – Photographic Documentation.
 - .2 By others, rectified photography and detailed interior photos of the building will be carried-out after the Work is complete. The Contractor may ask for digital copies of these reports/drawings for reference.
 - .3 The Contractor will be required to identify all new wood structural members with a date stamp branding. See Section 06 03 13 – Conservation Treatment of Period Log Construction.
- .5 See Appendix F - Work Horse Barn, Bar U Ranch Historical Site, Heritage Record Update 2011.

1.3 GENERAL HISTORICAL/ARCHAEOLOGICAL FEATURES

- .1 The Workhorse Barn Rehabilitation Project, R.083678.001 is within the boundary of the Bar U National Historic Site. The Workhorse Barn is located to the south of the central east-west Township Road 171B which is the site road of the Bar U Ranch National Historic Site. The Workhorse Barn is one of 30 Federal Heritage Classified Buildings under the Historic Sites and Monuments Act, and it is an integral part of the over 40 features of the Bar U Ranch National Historic Site. The building is considered to be a

cultural resource of national historic significance designated as having important cultural value by the Parks Canada Cultural Resource Management (CRM) Program.

- .2 Bar U Ranch National Historic Site of Canada comprises 148.43 hectares of rangeland that constitute the original headquarters site of an Alberta cattle ranch established in the 1880s. Located in a shallow east-west valley along the banks of Pekisko Creek in southern Alberta's foothills, the ranch includes rolling uplands, level flats, covered creek bottoms and a variety of wooden ranch buildings. The designation refers both to the landscape and the built elements of the site.
- .3 The Bar U Ranch was designated a national historic site of Canada in 1989 because of its important role in the ranching industry in Canada.
- .4 The heritage value of Bar U Ranch National Historic Site of Canada lies in the integrity of its cultural landscape as a representation of Alberta ranching in the 1880-1950 period. It is embodied in the enduring rural character of the landscape, in its continued use for cattle raising, and in the traditional elements of the ranch landscape associated with foothills cattle country, both natural and man-made.
- .5 The Workhorse Barn, also known as building 17, is the largest log structure at the Ranch. Its massing includes an original two-story log structure with a gable roof, believed to have been constructed between 1883 and 1895, with a one-story light frame, shed-roofed addition on its west side, constructed by 1916. The hay sling and accompanying roof peak at the south end were installed between 1931 and 1946. The structural design of the Workhorse Barn is a rare example of historic log construction of this size in Canada and, as made obvious through its open and unclad interior, demonstrates the high level of craftsmanship employed at the time.
- .6 The Heritage Value of the Workhorse Barn, the Character Defining Elements of the building itself and the cultural value of the Bar U National Historic Site and its inherent use and landscape are to be protected and respected.
- .7 The Departmental Representative is responsible for obtaining FHBRO approvals for the rehabilitation work to the Workhorse Barn. Contractor is responsible for verifying from the Departmental Representative whether the requisite approvals have been achieved before any work to the building is commenced.

1.4 NORTH WALL DECORATIVE PARGING

- .1 Objective: To create a detailed mould that captures the tool work and impressions of the existing North Wall decorative parging prior to removal so that an exact replica could be created in its entirety at a later date.
- .2 Scope of work: surface repairs where required, application of silicone rubber and application of hard shell. Segment as required.
- .3 Contractor is to submit a proposed method of work for approval by Departmental Representative prior to lifting, moving, or demolition of any related building elements.

1.5 CONTRACT METHOD

- .1 Relations and responsibilities between Contractor and subcontractors and Departmental Representatives are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:
 - .1 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide.

1.6 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.
 - .1 In addition to archaeologist contracted by Contractor, Archaeological Inspections and Oversight may will be provided by Parks Canada. Contractor's archaeologist is to coordinate with Parks Canada archaeologists. Contractor's archaeologists will be on site during any excavating work where soil is disturbed. Parks Canada archaeologist to be called-in when items of significant cultural value may be discovered.
- .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 the Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

1.7 WORK SCHEDULE

- .1 Bat Window: The hay loft houses a population of bats which are a species at risk. For mitigation of harm of the species in concert with Parks Canada policies construction is severely restricted as listed in Appendix A BIA. Any work proposed to occur during this time must be approved by Parks Canada and must be proven to not disturb the roosting bats. This includes tools, materials, and construction related activities.
- .2 Regular operational hours of Bar U Ranch are May 14 to September 30 daily from 10 am to 5 pm. Access to the rest of the site including all roads must be maintained at all times unless otherwise coordinated with and approved by Departmental Representative.

1.8 WORK SEQUENCE

- .1 Mould of the North Wall decorative parging must be completed prior to lifting and/or moving the barn.
- .2 Designs and submittals must be received as reviewed and accepted before associated work can commence. Departmental Representatives require 2 weeks for all reviews unless otherwise indicated.
- .3 Complete the work in timely fashion. Contractor to submit construction work schedule to Departmental Representative for review and approval.

1.9 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work, for storage, and for access, to allow:

- .1 Departmental Representatives use of entire Bar U National Historic Site outside Designated Work Area.
- .2 Public access and usage to areas outside the Designated Work Area.
- .3 Work by other contractors.
- .2 Co-ordinate use of premises, access and entire Bar U site under direction of the Departmental Representative.
- .3 Co-ordinate use of additional storage or work areas needed for operations under this Contract with Departmental Representative.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain. All original elements of the building are to be protected as much as possible.
- .5 Any repair or replacement of portions of existing fabric which are not described in the drawings and which the Contractor considers necessary to remove for the sake of construction operations are to occur only with written approval from the Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.10 DEPARTMENTAL REPRESENTATIVE OCCUPANCY

- .1 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Departmental Representative and public use of entire site outside of the Designated Work Area.

1.11 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDINGS

- .1 Execute work with least possible interference or disturbance to site operations, public, other buildings and normal use of the Bar U National Historic Site. Arrange with Departmental Representative to facilitate execution of work.

1.12 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to vehicular traffic pedestrians and operations.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .4 Submit schedule to and obtain approval from Departmental Representative 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.

- .5 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.
- .6 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .8 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .9 Record locations of maintained, re-routed and abandoned service lines.
- .10 Construct barriers in accordance with Section 01 56 00- Temporary Barriers and Enclosures .

1.13 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 Other documents as specified.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 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 Access to the site is to be along the main east-west road through the site (Township Rd 171A), parallel to route 540. Both ends of this road are gated. It is recommended that large vehicles enter through the east gate because of the tight downhill turn at the west end. For access to the site outside normal Bar U National Historic Site hours contact Departmental Representative 48 hours before access is required.

1.3 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of Bar U National Historic Site. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to entire site and buildings and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Contractor will be responsible for providing and maintaining sanitary facilities for use by Contractor's personnel. Keep facilities clean. Coordinate with Departmental Representative for appropriate placement of temporary sanitary facilities on site.
- .5 Closures: protect work temporarily until permanent enclosures are completed.
- .6 Most buildings on the site are "Classified" Federal Heritage Buildings. Subsidiary structures (corrals, bridges, fences and gates) and the landscape are also considered to have cultural value. Protect all elements of the site that may be affected by construction noise, vibration, dust and debris or vehicular traffic. Make arrangements with Departmental Representative to determine appropriate measures of protection.
- .7 The site, as a National Historic Site is accessible by the Public and will be in continuous use for Parks Canada staff and community groups throughout the duration of the Work. Many domesticated animals are also housed on site. Make arrangements with Departmental Representative to determine appropriate measures of protection and establishment of temporary boundaries. See also Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 The Workhorse Barn will be inaccessible to the Public during the period of Work. The building is in close proximity to other buildings which may remain in use. Coordinate with Departmental Representative use of areas around adjacent buildings and corrals.

1.5 BAT WINDOW

- .1 Bat Window: The hay loft houses a population of bats which are a species at risk. For mitigation of harm of the species in concert with Parks Canada policies construction is severely restricted from April 1 to September 15. Any work proposed to occur during this time must be approved by Parks Canada and must be proven to not disturb the roosting bats. This includes tools, materials, and construction related activities. Contractor to follow Appendix A – BIA.

1.6 CULTURAL RESOURCES/ARTIFACTS

- .1 See Appendix B - Statement of Work for Archaeological Mitigations.
- .2 Definition of a Cultural Resource: Any object, grouping of objects, place, or evidence of past human occupation that may be associated with an aspect of human history and culture.

1.7 PARKS CANADA REQUIREMENTS

- .1 Inform Departmental Representative of any impacts to the ground surface prior to conducting work not specified in this current document that may affect the ground surface or involve breaking the ground surface.
- .2 Contractor to provide information to Departmental Representative as it becomes available, prior to and during construction. Some items for consideration/areas of concern:
 - .1 Stockpiling of materials
 - .2 Machinery: Inform Departmental Representative when large machines may be used, their intended manner of usage, approximate time frame of usage and potential impacts to the ground.
 - .3 Scaffolding and Fencing: Without prior approval from Departmental Representative
 - .1 Below ground surface anchoring is not permitted.
 - .2 Digging or pounding into the ground is not permitted.
- .3 Contractor to use the gentlest means of construction.

1.8 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel and vehicular traffic. Entire site related personnel and vehicular traffic outside the designated work areas must be maintained. If access roads to other areas of the site are to be temporarily blocked, give Departmental Representative 48 hours of notice for necessary blockage and intended length of time the area will be blocked in order to take appropriate measures.

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

1.9 SPECIAL REQUIREMENTS

- .1 The foreman is required to keep a list of contractor's employees and sub-contractors on site for each day of work. Each morning the activities and number of employees at work will be reviewed with the Bar U Ranch staff.
- .2 Parks Canada has prescribed mitigation measures for Environmental Impacts to the site that must be adhered to. Refer to Appendix # Bar U Ranch National Historic Site Building Refurbishment – Basic Environmental Impact Analysis (BIA), September 2015.
- .3 For loud noise generating Work give Departmental Representative 1 week of notice.
- .4 Submit schedule in accordance with Section 01 32 16.07- Construction Progress Schedule - Bar (GANTT) Chart.
- .5 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .6 Keep within limits of work and avenues of ingress and egress.

1.10 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security:
 - .1 Personnel employed on this project will be subject to security check.
 - .2 Lists of personnel on site must be maintained at all times by Contractor, and updated daily at 9:00 am each work day. All personnel must check into Site Office daily.

1.11 SITE SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted anywhere on the entire site.

1.12 FOUL LANGUAGE

- .1 As a National Historic Site the Public may be present during normal operational hours. Appropriate language is expected on the entire site. Personnel may be asked to leave the site if there is non-compliance to this policy.

END OF SECTION

Part 1 General

1.1 APPOINTMENT AND PAYMENT

- .1 Contractor is responsible for coordinating and paying for services of testing laboratories such as follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Tests specified to be carried out by Contractor under supervision of Departmental Representative.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.2 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4 Make arrangements with Departmental Representative for the provision of physical space for meetings. The Visitor Centre can be used during the off-season and the Ranch House can be used during the on-season.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance and Departmental Representative.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representatives, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 working days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colours. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site signs, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Delivery schedule of equipment.

- .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .8 Departmental Representative provided products.
- .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 During course of Work schedule progress meetings every 2 weeks. Alterations to the 2-week schedule will be possible with Departmental Representative approval.
- .2 Contractor, major Subcontractors involved in Work, and Departmental Representatives are to be in attendance.
- .3 Notify parties minimum 5 working days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 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 effect on construction schedule and on completion date.
 - .12 Health and Safety
 - .13 Other business.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Sunday, inclusive 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.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.3 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.

1.4 ACTIONS AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative 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 5 working days of receipt of acceptance of Master Plan.

1.5 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.

1.6 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.7 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Permits.
 - .4 Site surveys.
 - .5 Lifting proposal and design.
 - .6 Shop drawings for lifting design.
 - .7 Approvals for lifting design.
 - .8 Mobilization.
 - .9 Building stabilization.

- .10 Building lifting/relocation.
- .11 Recording of existing foundation/ archaeological observation.
- .12 Excavation/ archaeological cataloguing.
- .13 Piling.
- .14 Concrete foundation systems.
- .15 Stone in foundations.
- .16 Backfill.
- .17 Log repair and replacement, and heavy timber replacement and rehabilitation.
- .18 Building lifting/ relocation to new foundations.
- .19 Rehabilitation and/or Reinstallation of all interior elements.
- .20 Siding repair and replacement.
- .21 Painting roof.
- .22 Painting, chinking, daubing, repair and reinstatement of all finishes.
- .23 Landscaping.

1.8 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.

1.9 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.

END OF SECTION

Part 1 General

1.1 REQUIREMENTS

- .1 Contractor is to digitally record progress of the Project daily, at key stages of the Work and as reasonably stipulated by the Departmental Representative.
- .2 Images and recordings are to be of reasonable quality and quantity to enable the viewer to understand the context and subject being recorded.
- .3 Key plans to indicate views of photographs and videos.

1.2 TYPES OF DIGITAL RECORDING

- .1 Digital photographs:
 - .1 Minimum 4 megapixels per image in a standard format that will print proportionately on a 127mm x 178mm photographic paper, or as accepted by Departmental Representative.
 - .2 Digital format of jpeg, tiff, or 1 image on letter format pdf.
 - .3 Date stamp visible in the photograph and not obscuring subject matter of photograph.
- .2 Digital videos:
 - .1 Minimum frame rate of 30fps.
 - .2 Minimum of 600x800px.
 - .3 Aspect ratio of 4:3, 5:4, 16:9, or 16:10.
 - .4 Digital format of mov, mp4, avi, wmv.
 - .5 Date stamp visible in the video and not obscuring subject matter of video.

1.3 FREQUENCY AND PURPOSE OF DIGITAL RECORDINGS

- .1 Digital photographs must be made for each day of work, a minimum of six photos from different angles of work on site. In addition to this, close-ups of work in progress, and photographs of product labels may be submitted. For close-ups of work in progress, provide a minimum of two photos from different angles. These digital photographs must be uploaded to a server designated by the Departmental Representative as maximum of 1 week after the recording was taken, using filing system and formats approved by the Department Representative.
- .2 Digital video recordings may be used to supplement the photographs in order to convey better the context and viewpoint of the photographs. Audio commentary will be acceptable.
- .3 Required digital recording submittals before or during the following work:
 - .1 Pre-construction inspection.
 - .2 Close-ups of existing building elements to be removed for bracing work including details of attachments.
 - .3 Detachment of building section(s).

- .4 Pre-lifting of each section showing bracing.
- .5 Detailed photographs of any structure left in the ground after lifting and moving of building sections. Exact locations of existing stones to be marked and recorded on plans.
- .6 Excavation work.
- .7 Piling work.
- .8 Concrete work.
- .9 Stone work. Existing stone replaced to original locations.
- .10 Repair and replacement of logs.
- .11 Replacement of building sections on new foundations.
- .12 Repair of wood siding.
- .13 Painting of Bar U graphics on roof.
- .4 Digital recordings may be used to convey defects or conditions during the course of the work. Distribution of these files to be determined by the Departmental Representative.

1.4 QUALITY OF DIGITAL RECORDING

- .1 Images must be clear and understandable. Blurred, dark and out-of-focus photographs may be rejected. Videos that are too shaky or move too fast may be rejected.
- .2 Digital recordings may be rejected by the Departmental Representative as being unclear. In cases where digital images have been rejected the Departmental Representative may ask for additional images to be taken at no extra cost.
- .3 Number of viewpoints, and level of detail will depend on the item/condition being recorded.
- .4 Contractor to provide own digital recording equipment.

1.5 NAMING AND ORGANIZATION OF DIGITAL FILES

- .1 Files to be organized in folders that are named by year-month-date.
- .2 It is recommended to name files so that the viewer can understand which area of the building is being viewed.

1.6 BACK-UPS OF DIGITAL FILES

- .1 Contractor to keep a back-up of all digital files for the period of the Project warranty.
- .2 Contractor to provide copies of digital files upon request by Departmental Representative until the end of the warranty period.

1.7 SUBMISSION OF DIGITAL FILES

- .1 See Section 01 33 00 Submittal Procedures.
- .2 All recordings and documents are to be organized and submitted as part of Close-Out Documentation.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 ADMINISTRATIVE

- .1 Submit to Departmental Representative and Consultant 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 and Consultant. 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 and Consultant, 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's and Consultant's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative and Consultant review.
- .10 Keep one reviewed copy of each submission on site.

1.3 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 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion

of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

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

- .10 Submit 2 full-size hard copies and one electronic copy in pdf format of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit 2 full-size hard copies and one electronic copy in pdf format 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.
- .12 Submit 2 full-size hard copies and one electronic copy in pdf format 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.
- .13 Submit 2 full-size hard copies and one electronic copy in pdf format 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.
- .14 Submit one electronic copy in pdf format of manufacturer's 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.
- .15 Submit one electronic copy in pdf format of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .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.
- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades. SAMPLES

1.4 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to: 1 to Departmental Representative's business address and 1 to Departmental Representative's site representative (Parks Canada NHS & VE Manager, Bar U Ranch National Historic Site Parks Canada / Government of Canada Box 168, Longview AB T0L 1H0 travis.weber@pc.gc.ca / Tel: 403-395-2110)
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples 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.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

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

1.6 DIGITAL DOCUMENTATION

- .1 Submit electronic files of digital photography and videos at the beginning of each working week with notification to Departmental Representative in writing on agreed upon shareable cloud distribution site such as BIM360 or Wetransfer. Allow files to be shareable and downloadable for 2 weeks minimum. Organize files by dates recorded.
- .2 Submit 2 copies of identical DVDs or USBs of digital photography and videos for each designated submittal as described in Section 01 32 33, Digital Recording Documentation.
- .3 Submit 2 copies of identical DVD or USB sets of digital photography and videos upon completion of the project, a compilation of all files onto DVDs or USBs within one month of Substantial Completion date. The digital recordings and documentation must be organized and combined for Close-Out Document submittal.

- .4 Submit DVDs or USBs to be readable on standard computer operating systems (PC or Mac). It is recommended that the DVDs are delivered in envelopes or cases to prevent damages to the recording surfaces.
- .5 Identify clearly on DVDs project identification: name and number of project, submittal subject and date range of files on DVD.

1.7 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Health and safety considerations required to ensure that the General Contractor shows due diligence towards health and safety on the construction site.

1.2 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Alberta Occupational Health and Safety Act, R.S.A. – January 2016 or latest Edition.

1.4 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 assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representatives weekly.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets .
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's 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.

- .9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.5 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.
- .2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.6 SAFETY ASSESSMENT

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

1.7 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.8 REGULATORY REQUIREMENTS

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

1.9 PROJECT/SITE CONDITIONS

- .1 Work at site may involve contact with:
 - .1 Lead-containing paints.
 - .2 Mould-containing rotted wood.
 - .3 Guano from animals.

1.10 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.

1.11 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 and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.12 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta Reg. 62/2003.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.13 UNFORSEEN HAZARDS

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

1.14 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.

1.15 POSTING OF DOCUMENTS

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

1.16 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.

1.17 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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Province of Alberta
 - .1 Occupational Health and Safety Act, 2002.
- .2 Canada Labour Code, Canada Occupational Safety and Health Regulations 2002.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals 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 mobilization to site. Address following items:
- .3 Safety and health risk or hazard analysis for each site task and operation found in work plan.
- .4 Submit WHMIS MSDS - Material Safety Data Sheets to the Departmental Representative.
- .5 Develop checklist for items to be inspected on a daily basis. Document actions taken.
- .6 Personnel training requirements including:
 - .1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.
 - .2 Work practices by which personnel can minimize risks from hazards, safe use of engineering controls and equipment on site, medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards, and elements of site-specific Health and Safety Plan.
- .7 Personal protective equipment (PPE) program addressing:
 - .1 Donning and doffing procedures.
 - .2 PPE selection based upon site hazards.
 - .3 PPE use and limitations of equipment.
 - .4 Work mission duration, PPE maintenance, and storage.
 - .5 PPE decontamination and disposal.
 - .6 PPE inspection procedures prior to, during, and after use.
 - .7 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
 - .8 Medical surveillance requirements for personnel assigned to work at site.
 - .9 Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - .10 Site control measures employed at site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means

- for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
- .11 Decontamination procedures for both personnel and equipment.
- .12 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.
- .13 Written respiratory protection program for project activities.
- .14 Procedures dealing with heat and/or cold stress.
- .8 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.
- .9 Respirator Fit Testing: submit proof of respirator fit testing for site personnel, within 7 days after date of Notice to Proceed and prior to mobilization to site.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations as per the Province of Alberta, Occupational Health and Safety Act, 2002.
- .11 Off-site Contingency and Emergency Response Plan:
 - .1 Prior to commencing Work involving handling of hazardous materials, develop off-site Contingency and Emergency Response Plan.
 - .2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from site.

1.3 REGULATORY REQUIREMENTS

- .1 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.

1.4 SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Lead in the red, white, beige, and brown paint coats on wood at Site B (Workhorse Barn). Refer to Section 02 83 11 – Lead-based Paint Abatement – Intermediate Precautions.
 - .2 Mould and Animal Droppings at Site B (Workhorse Barn). Refer to Section 02 87 13.14 – Precautions for Mould/Rodent Feces Remediation - Medium Precautions.
 - .3 Crystalline Silica in the concrete foundations at Site B (Workhorse Barn).

- .4 Controlled Products (flammable/explosive): propane tank at Site B (Workhorse Barn).

1.5 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan prior to commencing site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Ensure Health and Safety guidelines provide for safe and minimal risk working environment for site personnel and minimize impact of activities involving contact with hazardous materials or hazardous wastes on general public and surrounding environment.
- .3 Relief from or substitution for portion or provision of minimum Health and Safety Guidelines specified or reviewed site-specific Health and Safety Plan must submitted to Departmental Representative in writing. Departmental Representative will respond in writing, either accepting or requesting improvements.

1.6 RESPONSIBILITY

- .1 Be responsible for safety of persons and property on site and for protection of persons off 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, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 HAZARD COMMUNICATION REQUIREMENTS

- .1 Comply with Chemical Hazards Regulation, Alta. Reg.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations, Part X - Hazardous Substances.
- .3 Provide Departmental Representative with Material Safety Data Sheets (MSDS) and documentation on any "hazardous" chemical that Contractor or Contractor Representatives plan to bring onto site.

1.8 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.
- .2 Assign responsibility and obligation to Health and Safety Officer where required to stop or start Work when, at Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety.
- .3 Departmental Representative may also stop Work for health and safety considerations where the Contractor fails to meet the minimum health and safety requirements, the costs and delays of such as stoppage shall not be grounds for a claim for extra costs.

1.9 UNFORESEEN HAZARDS

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

1.10 CERTIFIED INDUSTRIAL HYGIENIST

- .1 Employ and assign to Work, competent and authorized Certified Industrial Hygienist (CIH) as necessary. The CIH should:
 - .1 Be involved at start of the project as necessary to ensure the Work is planned and performed in accordance with the site-specific Health and Safety Plan.
 - .2 Review final reports.

1.11 PERSONNEL HEALTH, SAFETY, AND HYGIENE

- .1 Training: ensure personnel entering site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
- .2 Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity. Minimum PPE required for each level of protection as follows:
 - .3 Level C/Modified Level C:
 - .1 Respiratory: half mask, Cartridge - MSA GME-H (GME-P100).
 - .2 Head, Eye, Ear Protection: safety glasses, hard hat.
 - .3 Hand Protection: gloves.
 - .4 Foot Protection: safety shoes.
 - .5 Clothing: Disposable TYVEK chemically resistant coverall in accordance with Section 02 82 00.01 – Asbestos Abatement – Minimum Precautions, Section 02 83 11 – Lead-based Paint Abatement – Intermediate Precautions, and Section 02 87 13.14 – Precautions for Mould/Rodent Feces Remediation - Medium Precautions.
 - .4 Level D:
 - .1 Head, Eye, Ear Protection: safety glasses, hard hat.
 - .2 Clothing: standard work uniform.
 - .3 Gloves.
- .5 Anticipated levels of personal protection based on work activity are as follows:

Work Activity	Anticipated Level of Personal Protection
Abatement activities at Site B (Workhorse Barn)	Level C

- .6 Personal Protective Equipment:
 - .1 Furnish site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.
- .7 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
 - .1 Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses on site within work zones.
 - .2 Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.

- .3 Dispose of or decontaminate PPE worn on site at end of each workday.
- .4 Decontaminate reusable PPE before reissuing.
- .5 Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.
- .6 Ensure facial hair does not interfere with proper respirator fit.
- .8 Respiratory Protection:
 - .1 Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
 - .2 Develop, implement, and maintain respirator program.
 - .3 Monitor, evaluate, and provide respiratory protection for site personnel.
 - .4 Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified on site.
 - .5 Immediately notify Departmental Representative when level of respiratory protection required increases.
 - .6 Ensure appropriate respiratory protection during work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
 - .7 Assess ability for site personnel to wear respiratory protection.
 - .8 Ensure site personnel are able to pass respirator fit test prior to entering potentially contaminated work areas.
- .9 Heat Stress/Cold Stress: implement cold stress and heat stress monitoring program as applicable and include in site-specific Health and Safety Plan.
- .10 Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
 - .1 Suitable containers for storage and disposal of used disposable PPE.
 - .2 Potable water and suitable sanitation facility.
- .11 Emergency and First-Aid Equipment:
 - .1 Locate and maintain emergency and first-aid equipment in appropriate location on site including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.
- .12 Site Communications:
 - .1 Post emergency numbers near site telephones.
 - .2 Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
 - .3 Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
 - .4 Furnish selected personnel with 2-way radios.
 - .5 Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and

protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

1.12 AIR MONITORING

.1 Air Monitoring Program:

- .1** Develop air monitoring program meeting specified requirements. Air monitoring is required when conducting hazardous material abatement work only.
- .2** During progress of work activities, monitor air quality in and around work zones. Conduct monitoring on regular periodic basis, and additionally as required by special or work-related conditions. Report departures from general background to Departmental Representative who will, in conjunction with Health and Safety Officer, determine when operations should be shut down and restarted.
- .3** Operate air monitoring equipment with personnel trained in equipment provided and under control of Health and Safety Officer.
- .4** Conduct air monitoring on routine basis around active work locations. Perform hourly monitoring minimum and additionally as dictated by site activities.
- .5** Furnish wind speed and direction indicator capable of providing permanent record, at unobstructed location on site located above elevation of work area with unobstructed view to affected workers.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS 2015), Safety Data Sheets (SDS).

1.2 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for materials listed in Section 02 82 00.01 – Asbestos Abatement – Minimum Precautions, Section 02 83 11 – Lead-based Paint Abatement – Intermediate Precautions, and Section 02 87 13.14 – Precautions for Mould/Rodent Feces Remediation - Medium Precautions and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.14 – Health and Safety for Contaminated Sites.
- .3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
- .4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction as per Appendix A - BIA.
- .5 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .6 Include in Environmental Protection Plan (if any items conflict with Appendix A – BIA, the BIA will take precedent).
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.

- .4 Descriptions of environmental protection personnel training program.
- .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
- .7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
 - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
- .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
- .12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .13 Designated Work Area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .14 Archaeological Plan that defines procedures for identifying and protecting archaeological resources.
- .15 Species-at-risk Protection Plan that defines procedures for identifying and protecting species-at-risk.

1.4 ORIENTATION SESSION

- .1 The Waterton Field Unit of Parks Canada Agency will conduct an orientation session for Contractor and Sub-Contractors to attend prior to any work on site.

1.5 FIRES

- .1 Fires and burning of rubbish on site is not permitted.
- .2 Take precaution around fuel/debris stockpiled on site with respect to wildfires

1.6 DRAINAGE

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials and meets applicable regulatory criteria for discharge.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.7 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
 - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.

1.8 WORK ADJACENT TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Use of waterway beds is not permitted for borrow material.
- .3 Waterways to be kept free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.
- .5 Do not skid logs or construction materials across waterways.
- .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .7 Work with potential impact to waterways requires a Working Near Water Plan as part of Environmental Protection Plan submission.

1.9 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

- .1 Provide temporary enclosures where directed by Departmental Representative.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.10 HISTORICAL/ARCHAEOLOGICAL CONTROL

- .1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.11 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
 - .1 Take action only after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

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

- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

- .1 Perform Work in accordance with 2014 Alberta Building Code (ABD) and 2015 National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of federal, provincial or local level, 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
 - .1 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
- .3 On-site work must comply with the following guidelines:
 - .1 Canada Labour Code (Part II), 1985.
 - .2 Canada Occupational Health and Safety regulations (Part X), latest edition.
 - .3 Public Services and Procurement Canada (PSPC) Asbestos Management Standard (June 5, 2017).
 - .4 National Joint Council Occupational Health and Safety Directive – Part XI – Hazardous Substances (January 1, 2011).
 - .5 PSPC Standard on Hazardous Substances, latest edition.
 - .6 Canadian Environmental Protection Act, 1999.
 - .7 Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Canadian Council of Ministers of the Environment (CCME), 1999, updated 2016.
 - .8 Canada Wide Standards (CWS) for Petroleum Hydrocarbons (PHCs) in Soil. CCME, 2001, updated 2008.
 - .9 Alberta Environment and Parks, Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2016).

1.3 BUILDING SMOKING ENVIRONMENT

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

1.4 NATIONAL PARKS ACT

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

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Except as otherwise specified, Constructor will apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
 - .1 Regulatory requirements and fees in force on date of Bid submission, and
 - .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

Part 2 Products

2.1 EASEMENTS AND NOTICES

- .1 Departmental Representative will obtain permanent easements and rights of servitude that may be required for performance of Work.
- .2 Constructor will give notices required by regulatory requirements.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 INSPECTION

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

1.3 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies may be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.
- .5 All quality control and quality assurance testing required to demonstrate conformance with the specifications is considered incidental to the contract and is the responsibility of the contractor to coordinate. Testing must be completed in accordance with the standards listed in the specifications.
- .6 A minimum of one concrete test must be completed per pour or per day of concrete placement. Compaction testing and inspection must be completed by a professional engineer, engaged by the contractor, to confirm that a minimum of 98% standard proctor is achieved and that concrete is not placed on frozen material.

1.4 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.

1.5 PROCEDURES

- .1 Notify appropriate agency Departmental Representative 7 days 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.

1.6 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, 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 the Departmental Representative.

1.7 REPORTS

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

1.8 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.9 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 as specified in specific Section.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Temporary Utilities Plan describing temporary hook-ups, requirements and controls. Provide site plan and access points.

1.3 INSTALLATION AND REMOVAL

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

1.4 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.5 WATER SUPPLY

- .1 Contractor to provide own continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Contractor to pay for utility charges.

1.6 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel. Contractor to pay costs.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

- .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress. The Contractor shall provide and install temperature data loggers. Data obtained from logs are to be sent to the Departmental Representative each morning.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 TEMPORARY POWER AND LIGHT

- .1 Contractor to pay for temporary power during construction for temporary lighting and operating of power tools.
- .1 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .2 Provide and maintain temporary lighting throughout project. Ensure level of illumination on floors and stairs is not less than 162 lx.
- .3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.8 TEMPORARY COMMUNICATION FACILITIES

- .1 If required, provide and pay for temporary telephone, fax, data hook up, lines and/or equipment necessary for own use.

1.9 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.189M-2000, Primer, Alkyd, for Wood, Exterior.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN3-A23.1-/A23.2-04, Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.
 - .2 CSA-0121-08(R2013), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit for approval Construction Site Usage Plan including Temporary Barriers and Enclosures and Temporary Horse Barn with references to construction phasing if necessary.
- .3 No Work shall commence on site until written approval of Construction Site Usage Plan has been received by the Departmental Representative.
- .4 Submit drawings for Temporary Horse Barn stamped and signed by professional engineer registered or licensed in the Province of Alberta, Canada.

1.4 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud. Coordinate method of protection with Departmental representative.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.

- .5 Remove from site all such work after use.

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging platforms, temporary stairs as may be required.

1.6 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.

1.7 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.
- .3 Construction lay-down areas and storage to be approved by Departmental Representative. Refer to drawing A2 for intended lay-down area.

1.8 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work or site operations. Designated areas to be determined by Departmental Representative.
- .2 Provide and maintain adequate access to project site.

1.9 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size and furnished with drawing laydown table as coordinated with Departmental Representative.
- .2 Provide marked and fully stocked first-aid case in a readily available location.

1.10 TEMPORARY HORSE BARN

- .1 Provide a covered temporary horse barn that includes:
 - .1 7 tie stalls, minimum 6'-3" x 6'-3"
 - .2 2 box stalls, minimum 9'-0" x 9'-0"
- .2 Layout and configuration to be reviewed and approved by Departmental Representative prior to erection.
- .3 Locate as per Location Plan on Drawing A2, to be confirmed with Departmental Representative prior to erection.

- .4 Follow Archaeological guidelines as per Appendix B - Statement of Work for Archaeological Mitigations.
- .5 Follow BIA as per Appendix A - BIA
- .6 Structure must be stamped and signed by professional engineer registered or licensed in the Province of Alberta, Canada.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. Heritage materials salvaged from the Barn for reinstatement must be stored in clean and dry facilities so as to not damage or alter the condition of materials from when they were removed.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.12 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Permanent facilities may be used on approval of Departmental Representative.

1.13 CONSTRUCTION SIGNAGE

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .3 Provide measures for protection and diversion of traffic, including erection of barricades, and erection and maintenance of adequate warning, danger, and direction signs.
- .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.
- .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .7 Contractor to provide snow removal to Designated Work Area from highway 240 at the Bar U Ranch gate. Snow removal of Bar U Ranch access road (Township Road 171B) to Designated Work Area to be coordinated and established with Departmental Representative. Special procedures may be warranted for classified buildings adjacent to road 171B.

1.15 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.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 INSTALLATION AND REMOVAL

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

1.3 CONSTRUCTION BARRIERS, FENCING AND HOARDING

- .1 Erect temporary site enclosures without digging or pounding into the ground.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
- .3 Construction barriers are required to protect the public and/or animals, to protect Work in progress and to delimit areas of Work.
- .4 Provide heating and hoarding to protect building elements and Work that require minimum temperatures in the winter season.
 - .1 Concrete work
 - .2 Masonry work
 - .3 Work with epoxies
 - .4 Pre-treatment and painting work (note that both sides of the wall --- interior and exterior-- may need to be heated).

1.4 GUARDRAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, and open edges of roofs.

1.5 WEATHER ENCLOSURES

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

1.6 DUST TIGHT SCREENS

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

- .2 Maintain and relocate protection until such work is complete.

1.7 ACCESS TO SITE

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

1.8 FIRE ROUTES

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

1.9 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.

1.10 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Be responsible for damage incurred due to lack of or improper protection.
- .4 Departmental Representative will determine minimum distances from buildings for safe operation of equipment and scaffolding to prevent damage to historical resources. Confirm with Departmental Representative prior to commencement of any Work.

1.11 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 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.
- .4 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.3 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.

1.4 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.

1.5 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

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

1.7 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.

1.8 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 the Departmental Representative, whose decision is final.

1.9 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 REMEDIAL WORK

- .1 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.
- .2 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.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

1.12 FASTENINGS

- .1 Salvage existing fasteners where possible.
- .2 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

- .3 Prevent electrolytic action between dissimilar metals and materials. Use compatible materials or separate dissimilar metals using methods approved by Departmental Representative.
- .4 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.
- .5 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage.
- .6 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .7 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .8 Situate and locate flashings, membranes, and materials carefully in accordance with good practice for installation. Ensure materials are lapped in correct sequence to ensure water flows away from building envelope.

1.13 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.

1.14 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, other buildings on site, operations on site and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES

- .1 Departmental Representative's identification of existing survey control points and property limits.

1.3 QUALIFICATIONS OF SURVEYOR

- .1 Qualified registered land surveyor, licensed to practise in Place of Work, acceptable to Departmental Representative.

1.4 SURVEY REFERENCE POINTS

- .1 Existing base horizontal and vertical control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

- .1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Provide as-built topographic survey.
- .3 Establish lines and levels, locate and lay out, by instrumentation.
- .4 Stake for grading, fill and topsoil placement and landscaping features.
- .5 Stake slopes and berms.
- .6 Stake batter boards for foundations.
- .7 Precisely locate all pilings.
- .8 Establish foundation column locations and floor elevations.

- .9 Establish lines and levels for mechanical and electrical work.

1.6 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.7 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.8 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.
- .4 Contractor will provide Auto Cad as-built drawings.

1.9 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.10 SUBSURFACE CONDITIONS

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

- .2 After prompt investigation, should Departmental Representative determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which is not detailed in the Contract 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.

1.3 MATERIALS

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

1.4 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

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

1.5 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, and which will provide proper surfaces to receive patching and finishing.
- .7 Restore work with new products in accordance with requirements of Contract Documents.
- .8 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .9 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Departmental Representative or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in an appropriately labelled and covered metal containers. Ensure each has an appropriate Materials Safety Data Sheet supplied.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Departmental Representative or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean glass and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove dirt from electrical fixtures.
- .9 Vacuum clean building interiors and exposed structural members.
- .10 All interior walls to be washed. Hand brush with soap and water. Existing paint and whitewash finishes are to remain. Protect as required during cleaning process.
- .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 Clean and sweep roofs.
- .15 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .16 Remove snow and ice from access to building.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss Departmental Representative's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 Departmental Representative's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites. Prior to project completion provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced. The overall waste diversion goal for this project is to divert wood shingles from going to landfill, responsible reuse and removal of soil, and recycling of packaging and beverage containers during construction.
- .3 Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.
- .4 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .5 Protect environment and prevent environmental pollution damage.

1.3 DEFINITIONS

- .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
- .2 Class III: non-hazardous waste - construction renovation and demolition waste.
- .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
- .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).
- .5 Inert Fill: inert waste - exclusively asphalt and concrete.
- .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre- defined categories

and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.

- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.
- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. Refer to Schedule A.
- .15 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.
- .16 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .17 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

1.4 DOCUMENTS

- .1 Maintain at job site, one copy of following documents:
 - .1 Waste Reduction Workplan.

1.5 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
 - .1 1 copy and 1 electronic copy of completed Waste Reduction Workplan (WRW).
- .3 Submit prior to final payment the following:
 - .1 Waste Diversion Report, indicating final quantities in tonnes by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials.

1.6 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare and submit WRW at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
 - .1 Applicable regulations.
 - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
 - .3 Destination of materials identified.
 - .4 Deconstruction/disassembly techniques and schedules.
 - .5 Methods to collect, separate, and reduce generated wastes.
 - .6 Location of waste bins on-site.
 - .7 Security of on-site stock piles and waste bins.
 - .8 Protection of personnel, sub-contractors.
 - .9 Clear labelling of storage areas.
 - .10 Training plan for contractor and sub-contractors.
 - .11 Methods to track and report results reliably.
 - .12 Details on materials handling and removal procedures.
 - .13 Recycler and reclaimer requirements.
 - .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
 - .15 Requirements for monitoring on-site wastes management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .5 Post WRW or summary where workers at site are able to review content.
- .6 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project.

1.7 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.8 WASTE PROCESSING SITES

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.9 QUALITY ASSURANCE

- .1 After award of Contract, a mandatory site examination will be held for this Project for Contractor and/or sub-contractors responsible for construction, renovation demolition/deconstruction waste management.
 - .1 Date, time and location will be arranged by Departmental Representative.
- .2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting. Written Waste Diversion Report summary to be provided by Waste Management Coordinator at the completion of the project.

1.10 STORAGE, HANDLING AND PROTECTION

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

- .1 On-site source separation is recommended.
- .2 Remove co-mingled materials to off-site processing facility for separation.
- .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
- .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.11 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.
 - .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

1.12 SCHEDULING

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 APPLICATION

- .1 Do Work in compliance with WRW and WSSP.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale of salvaged or recyclable materials are not permitted.

3.4 WASTE DIVERSION REPORT

- .1 At completion of Project, prepare written Waste Diversion Report indicating quantities of materials reused, recycled or disposed of as well as the following:
 - .1 Identify final diversion results and measure success against goals from Waste Reduction Workplan.
 - .2 Compare final quantities/percentages diverted with initial projections in Waste Reduction Workplan and explain variances.
 - .1 Supporting documentation.
 - .2 Waybills and tracking forms.
 - .3 Description of issues, resolutions and lessons learned.

3.5 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

- .1 Alberta
 - .1 Alberta Environmental Protection: Petroleum Plaza, South Tower 9915- 108th Street, Edmonton, AB T5K 2G8, 403-427-2739
 - .2 Alberta Special Waste Management Corporation: Pacific Plaza, Suite 610, 10909 Jasper Ave NW, Edmonton, AB T5J 3L9, 403-422-5029

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Certificates required by Utility companies: submitted.
 - .4 Operation of electrical and mechanical systems: demonstrated to Departmental Representative's personnel.
 - .5 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative.
 - .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.

1.3 FINAL CLEANING

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

Bar U Ranch NHSC
Work Horse Barn Rehabilitation
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CLOSEOUT PROCEDURES

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END OF SECTION

1.1 PRECEDENCE

- .1 For Federal Government Projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting two weeks prior to contract completion with contractor's representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements. .
 - .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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .3 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 CONTRACTOR PREPARED MAINTAINANCE MANUAL

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by 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 file(s) in dwg format on CD.

1.5 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 Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.6 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.

- .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital documentation and DVDs, for site records as described in Section 01 32 33- Digital Recording Documentation.

1.8 FINAL SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 71 00- Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 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.

1.10 MAINTENANCE MATERIALS

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

1.11 DELIVERY, STORAGE AND HANDLING

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

1.12 WARRANTIES AND BONDS

- .1 Submit Manufacturer's warranty certificate indicating warranty coverage for a period of 12 months following Substantial Completion as certified by Departmental Representative.
- .2 Verify that documents are in proper form, contain full information and are notarized.
- .3 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .4 Develop warranty management plan to contain information relevant to Warranties, Manufacturers' Guarantees and Bonds.
- .5 Submit warranty management plan, 60 days before planned pre-warranty conference, to Departmental Representative for approval.

- .1 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .2 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .6 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .7 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.
- .8 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.
- .9 Conduct joint 12 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .10 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.
- .3 Contractor's plans for attendance at 12 month post-construction warranty inspections.
- .11 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .12 Written verification to follow oral instructions.
- .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM F 3125 / F3125M [15a] Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
- .2 CSA Group (CSA)
 - .1 CSA B111-[1998 (R2003)], Wire Nails, Spikes and Staples.
 - .2 CSA-G40.20-[13]/G40.21-[13], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .3 CAN/CSA O86-[14], Engineering Design in Wood.
 - .4 CSA O151-[09(R2017)], Canadian Softwood Plywood.
 - .5 CSA-S16-[14], Design of Steel Structures.
 - .6 .CAN/CSA S136 [12], PACKAGE Consists of S136-12 - North America Specification for the Design of Cold Formed Steel Structural Members and S136.1-12 - Commentary on North American specification for the design of cold-formed steel structural members.
- .3 National Lumber Grading Authority (NLGA)
 - .1 NLGA Standard Grading Rules for Canadian Lumber [2014].

1.2 DEFINITIONS

- .1 Bracing: temporary support installed in an excavation or a structure to stabilize against deformations or failure. (Resisting lateral loads)
- .2 Shoring: temporary support installed in an excavation or a structure to relieve loads.
- .3 Poling board: a timber plank driven into soft soil, or held in place by waling planks and struts, to support the sides of an excavation
- .4 Soldier pile: a vertical member which takes the side thrust from horizontal sheeting and which is supported by struts across an excavation. A vertical member used to prevent the movement of formwork; is held in place by struts, bolts, or wires.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures
 - .1 Provide Engineered shop drawings: in accordance with Section 01 33 00 - Submittal Procedures, and meeting the requirements of Specification Section 02 43 13.01 – Historic Structure Lifting/Moving, stamped and signed by professional engineer registered or licensed in Alberta, Canada.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:

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

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Structural wood members: to CSA O86-[14]
- .2 Structural steel members: to CSA G40.21,
- .3 Wood connections: to CSA O86-[14]
- .4 Steel connections: to CSA G40.21,
- .5 Nails: to CSA B111.

2.2 PERFORMANCE CRITERIA

- .1 Ensure that materials, equipment and procedures:
 - .1 Safely support existing structure and construction live loads.
 - .2 Allow work to be accomplished.
 - .3 Minimize risk of damage to historic and archaeological elements.
 - .4 Meet requirements of Specification Section 02 43 13.01 – Historic Structure Lifting/Moving.

2.3 SOURCE QUALITY CONTROL

- .1 Timber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: by grade mark in accordance with applicable CSA standards.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Before starting work, verify existing conditions and variations from original Contract Documents and notify Departmental Representative.

3.2 PREPARATION

- .1 Refer to Specification Section 02 43 13.01 – Historic Structure Lifting/Moving.
- .2 Maintain area free of standing water for duration of the Work.
- .3 Protect wood elements and hardware in direct contact with shoring, bracing components.

3.3 INSTALLATION - GENERAL

- .1 Obtain approval from Departmental Representative before execution.

- .2 Support individual elements that become loose during shoring, bracing installation.
- .3 Erect structural steel work to CAN/CSA-S16 and CAN/CSA-S136.
- .4 Refer to Specification Section 02 43 13.01 – Historic Structure Lifting/Moving.
- .1 Obtain site reviews of Contractor engaged Professional Engineer who prepared engineered shop drawings per 1.3.1.1 above, and provide documentation of acceptance of bracing and shoring installations by said engineer.

3.4 BRACING OF STRUCTURES

- .1 Compensate for unevenness, out-of-plumb of wall surfaces
- .2 Install protection measures to protect existing wood and metal elements from damage.
- .3 Refer to Specification Section 02 43 13.01 – Historic Structure Lifting/Moving.

3.5 BRACING OF EXCAVATIONS

- .1 Conduct work in accordance with the current legislation.

3.6 ADJUSTMENT

- .1 Monitor bracing, shoring, system performance and maintain its effectiveness by making adjustments until final completion of project.
- .2 If adjustments exceed specified parameters notify Departmental Representative, and carry out corrective measures.
- .3 Obtain site reviews of Contractor engaged Professional Engineer who prepared engineered shop drawings per 1.3.1.1 above, and provide documentation of acceptance of bracing and shoring adjustments by said engineer.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section includes descriptions for demolishing, salvaging, recycling and removing site work items identified for removal in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 No measurement will be made under this Section.

1.3 REFERENCE STANDARDS

- .1 Canadian Council of Ministers of the Environment (CCME)
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.4 DEFINITIONS

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.
- .3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.
 - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
 - .2 Indicates quantities of reuse, recycling and landfill.
- .4 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .5 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Site Meetings.

- .1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades and archaeological concerns.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
- .3 Hold project meetings bi-weekly.
- .4 Ensure key personnel, site supervisor, project manager, subcontractor representatives and WMC attend.
- .5 Reporting Requirements: WMC to complete.
- .6 WMC must provide verbal report on status of waste diversion activity at each meeting.
- .7 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
- .3 .1 Notify Departmental Representative in writing when unforeseen delays occur.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
 - .2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures, where required by authorities having jurisdiction.
- .3 Hazardous Materials:
 - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .4 Waste Reduction Workplan:
 - .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and indicate:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
 - .2 Schedule of selective demolition.

- .3 Number and location of dumpsters.
- .4 Anticipated frequency of tippage.
- .5 Name and address of haulers, waste facilities, and/or waste receiving organizations.
- .5 Certificates:
 - .1 Submit copies of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site on monthly basis upon request of Departmental Representative.
 - .2 Written authorization from Departmental Representative is required to deviate from, facilities or receiving organizations listed in Waste Reduction Workplan.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.
- .2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures..
- .2 Storage and Protection.
 - .1 Protect in accordance with Section 31 00 99 – Earthwork for Minor Works.
 - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
 - .3 Remove and store materials to be salvaged, in manner to prevent damage.
 - .4 Store and protect in accordance with requirements for maximum preservation of material.
 - .5 Handle salvaged materials as new materials.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures and Appendix A.
 - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

- .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout the project.
- .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities as directed by Departmental Representative.
- .6 Protect trees, plants and foliage on site and adjacent properties where indicated.

1.10 EXISTING CONDITIONS

- .1 Hazardous Remove contaminated or hazardous materials listed as hazardous as defined by authorities having jurisdiction from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.
- .2 List of potentially hazardous materials:
 - .1 potentially lead-containing paint.
 - .2 potentially mould-containing wood.
 - .3 potentially guano from animals.

1.11 EQUIPMENT

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

Part 2 Execution

2.1 PREPARATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

2.2 REMOVAL OF HAZARDOUS WASTES

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

2.3 REMOVAL OPERATIONS

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.

- .3 Stockpile topsoil for final grading and landscaping:
 - .1 Provide erosion control and seeding if not immediately used.
- .4 Salvage:
 - .1 Items to be salvaged: temporary structural posts.
 - .2 Dismantle items containing materials for salvage and stockpile salvaged materials at locations as indicated.
- .5 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse on site as instructed by Departmental Representative at authorized facilities approved in Waste Reduction Workplan.
- .6 Backfill:
 - .1 Backfill in areas as indicated and in accordance with Section 31 00 99 – Earthwork for Minor Works.

2.4 STOCKPILING

- .1 Stockpile topsoil in accordance with Section 31 00 99 - Earthwork for Minor Works.
- .2 Label stockpiles, indicating material type and quantity.
- .3 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .4 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .5 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

2.5 REMOVAL FROM SITE

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved haulers, facilities and receiving organizations listed in Waste Reduction Workplan and in accordance with applicable regulations.
 - .1 Written authorization from Departmental Representative is required to deviate from facilities, receiving organizations listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

2.6 RESTORATION

- .1 Restore landscaped areas and existing works outside areas of demolition or Work to conditions that existed prior to beginning of Work match condition of adjacent, undisturbed areas, or to directions received by Departmental Representative.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

2.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
 - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

2.8 PROTECTION

- .1 As the site and many of the buildings on site are considered to have heritage value, consult with Departmental Representative about damages to adjacent materials, landscaping or buildings caused by selective site demolition. Repair of damages to buildings outside the scope of this Work is likely to cause substantial delays to schedules as procedures and methods of repairs will be reviewed by FHBRO as well as the project team.
- .2 All other elements of the building which are not expected to be altered shall be protected adequately from damage. Coordinate all protection of building elements with Departmental Representative.
- .3 Landscape and buildings outside the area of Work may need to be protected from damage. Coordinate with Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS:

- .1 Canadian Council of Ministers of the Environment (CCME)
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.
- .4 CSA S350-[M1980(R2003)], Code of Practice for Safety in Demolition of Structures.
- .5 American National Standards Institute (ANSI), [ANSI A10.8](#) 2011, Safety Requirements for Scaffolding
- .6 National Fire Protection Association (NFPA)
 - .1 NFPA 241 13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.2 DEFINITIONS

- .1 Definitions:
 - .1 Deconstruction: systematic dismantling of structure or parts thereof in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials. Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.
 - .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.
 - .3 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.
Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
 - .1 Indicates quantities of reuse, recycling and landfill.
 - .4 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
 - .5 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT)
 - .1 Review installation and substrate conditions.
 - .2 Verify project requirements for documentation, cataloging, reinstatement prior to removals.
 - .3 Co-ordinate with other building subtrades and archaeological concerns.
 - .4 Review lead times for materials.
- .2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
- .3 Hold project meetings bi-weekly.
- .4 Ensure key personnel, site supervisor, project manager, subcontractor representatives and WMC attend.
- .5 Reporting Requirements: WMC to complete.
- .6 WMC must provide verbal report on status of waste diversion activity at each meeting.
- .7 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
 - .1 Notify Departmental Representative in writing when unforeseen delays occur.

1.4 ACTION AND INFORMATION SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
 - .2 Submit for review drawings, diagrams or details showing sequence of deconstruction, removal work and temporary supporting structures. Refer to Specification Section Historic Structure Lifting/Moving - 02 43 13.01.
 - .3 Protection Plan as part of Protection Plan submission in accordance Summary of Work - 01 11 00.
- .3 Hazardous Materials:
 - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.
- .4 Waste Reduction Workplan:
 - .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and indicate:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.

- .5 Name and address of haulers, waste facilities, and/or waste receiving organizations.
- .6 Landfill Records: Indicate receipt and acceptance of deconstruction waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- .5 Certificates:
 - .1 Submit copies of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site on monthly basis upon request of Departmental Representative.
 - .2 Written authorization from Departmental Representative is required to deviate from, facilities or receiving organizations listed in Waste Reduction Workplan.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.
- .2 Qualifications: provide adequate workforce training through meetings and demonstrations. Have someone on site with deconstruction experience throughout project for consultation and supervision purposes.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures..
- .2 Storage and Protection.
 - .1 Protect existing items designated to remain and items designated for salvage in accordance with Protection Plan submission. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
 - .2 Remove and store materials to be salvaged, in manner to prevent damage including protection from exposure to moisture, water and sun. Location of storage materials and equipment as per approved material and equipment storage plan submission as per Summary of Work -01 11 00.
 - .3 Store and protect in accordance with requirements for maximum preservation of material.
 - .4 Handle salvaged materials as new materials.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and

1.7 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure that selective deconstruction work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

- .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout the project.
- .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities as directed by Departmental Representative.
- .6 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .2 Existing Conditions.
 - .1 Remove contaminated or hazardous materials listed as hazardous as defined by authorities having jurisdiction from site, prior to start of deconstruction work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.
 - .2 List of potentially hazardous materials:
 - .1 Potentially lead-containing paint.
 - .2 Potentially mould-containing wood.
 - .3 Potentially guano from animals.

PART 2 PRODUCTS

2.1 EQUIPMENT

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

PART 3 EXECUTION

3.1 PREPARATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting.
- .4 Ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
 - .1 Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from DR. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - .2 Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - .3 Protect existing site improvements, appurtenances, and landscaping to remain.

- .4 Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- .5 Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain in accordance with Section 01 51 00, and as follows:
 - .1 Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - .2 Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - .3 Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - .4 Cover and protect furniture, furnishings, and equipment that have not been removed.
- .6 Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities in accordance with Section 01 52 00 - Construction Facilities.
- .7 Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise in accordance with Section 01 51 00 – Temporary Utilities.
- .8 Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished:
 - .1 Strengthen or add new supports when required during progress of selective demolition.

3.2 REMOVAL OF HAZARDOUS WASTES

- .1 Prior to start of deconstruction work remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.3 REMOVAL OPERATIONS

- .1 Systematically remove items as indicated.
- .2 Do not disturb items designated to remain in place.
- .3 Stockpile topsoil where useable for final grading and landscaping:
 - .1 Provide erosion control and seeding if not immediately used.
- .4 Salvage:
 - .1 Items to be salvaged:
 - .1 Foundation sandstone units.
 - .2 Original logs removed for replacement.
 - .3 All wood and hardware components and other materials that are necessary to temporarily remove and reinstate in order to carry out the work.
 - .2 Systematically Catalogue elements for salvage and stockpile and protect salvaged materials at locations as indicated.

- .5 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse on site as instructed by Departmental Representative at authorized facilities approved in Waste Reduction Workplan.
- .6 Backfill:
 - .1 Backfill in areas as indicated and in accordance with Section 31 00 99 – Earthwork for Minor Works.

3.4 STOCKPILING

- .1 Stockpile topsoil in accordance with Section 31 00 99 - Earthwork for Minor Works.
- .2 Label stockpiles, indicating material type and quantity.
- .3 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .4 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .5 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .3 Transport material designated for alternate disposal using approved haulers, facilities and receiving organizations listed in Waste Reduction Workplan and in accordance with applicable regulations.
 - .1 Written authorization from Departmental Representative is required to deviate from facilities, receiving organizations listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.6 SITE RESTORATION

- .1 Restore landscaped areas and existing works outside areas of demolition or Work to conditions that existed prior to beginning of Work match condition of adjacent, undisturbed areas, or to directions received by Departmental Representative.

- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
 - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

- .1 As the site and many of the buildings on site have heritage value, consult with Departmental Representative about damages to adjacent materials, landscaping or buildings caused by selective site demolition. Repair of damages to buildings outside the scope of this Work is likely to cause substantial delays to schedules as procedures and methods of repairs will be reviewed by FHBRO as well as the project team.
- .2 All other elements of the building which are not expected to be altered shall be protected adequately from damage. Coordinate all protection of building elements with Departmental Representative.
- .3 Landscape and buildings outside the area of Work may need to be protected from damage. Coordinate with Departmental Representative.

3.9 UTILITY SERVICES

- .1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations in accordance with Section 01 35 16.
- .2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - .1 Arrange to shut off affected utilities with utility companies.
 - .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - .4 Cut off pipe or conduit to a minimum of 25 mm below slab, and remove concrete mound.
- .3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.

- .4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.
- .5 Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

3.10 POLLUTION CONTROLS

- .1 Dust Control: Provide water mist, temporary enclosures or other suitable methods reviewed and accepted by the Departmental Representative to limit spread of dust and dirt. Comply with governing environmental protection regulations, and as limited below:
 - .1 Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 - .2 Wet mop floors to eliminate tracking of dirt, wipe down walls and doors of demolition enclosure.
- .2 Remove and transport debris to prevent spillage on adjacent surfaces and areas.
- .3 Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- .4 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.11 SELECTIVE DEMOLITION

- .1 Demolish and remove existing construction only to the extent required by new construction and as indicated, and to the minimum extent required for lifting, moving and reinstatement of structure. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - .1 Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - .2 Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - .3 Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - .4 Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain [fire watch and] portable fire suppression devices during flame cutting operations.
 - .5 Maintain adequate ventilation when using cutting torches.
 - .6 Remove decayed, vermin infested, or otherwise dangerous or unsuitable materials and promptly dispose of offsite.
 - .7 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

- .8 Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- .9 Dispose of demolished items and materials promptly.
- .10 Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- .2 Comply with Departmental Representative's requirements for using and protecting stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- .3 Removed and Salvaged Items:
 - .1 Clean salvaged items
 - .2 Pack or crate items after cleaning
 - .3 Identify contents of containers
 - .4 Store items in a secure area until delivery to Departmental Representative.
 - .5 Transport items to Departmental Representative's storage area on site designated by Departmental Representative.
 - .6 Protect items from damage during transport and storage
- .4 Removed and Reinstalled Items:
 - .1 Clean and repair items to functional condition adequate for intended re use. Paint equipment to match new equipment
 - .2 Pack or crate items after cleaning and repairing
 - .3 Identify contents of containers
 - .4 Protect items from damage during transport and storage
 - .5 Reinstall items in locations indicated
 - .6 Comply with installation requirements for new materials and equipment
 - .7 Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated
- .5 Existing Items to Remain:
 - .1 Protect construction indicated to remain against damage and soiling during selective demolition.
 - .2 Items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete
- .6 Concrete:
 - .1 Demolish in small sections using saw-cut methods. .
 - .2 Cut concrete full depth at junctures with construction to remain and at regular intervals, using power driven saw, then remove concrete between saw cuts.
 - .3 Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition
 - .4 Neatly trim openings to dimensions indicated
- .7 Concrete Slab Reinforcing:
 - .1 Locate location of any reinforcing steel or metal attachments in concrete slab prior to cutting or coring using non-destructive, non-ionizing radio frequency locators.

- .2 Notify the Departmental Representative immediately for further instructions where coring or cutting will damage existing features.
- .8 At Grade/Below Grade Construction: Carefully demolish concrete benching, parging and other existing concrete with hand tools where possible, without damaging logs above the bottom log to be replaced, or other wood components of the structure. Remove and salvage masonry foundation stones and clean stone units of concrete, mortar or other materials and retain for use in new foundation.

3.12 CLOSEOUT ACTIVITIES

- .1 Patching and Repairs: Promptly repair damage to adjacent construction caused by selective demolition operations and as follows:
 - .2 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) [except where explicitly noted otherwise for materials being salvaged for re use in new construction] and as follows:
 - .1 Promptly dispose of demolished materials.

END OF SECTION

PART 1 GENERAL

1.1 PERFORMANCE REQUIREMENTS

- .1 General Contractor, and Professional Engineer sub-contracted as required in Part 1.3 below, to have relevant experience in Historic Structure Lifting projects.
- .2 Protection of the entire structure, Main Barn and West Addition, and existing materials from damage or undue stresses.
- .3 Safe and supervised engineered means and methods to brace and support and move the existing structure to allow the specified work to be accomplished including disconnection and reconnection of the West addition to the Main Barn as required to perform the work.
- .4 Maintaining the integrity of all wood members and their connections, from any undue or damaging movement, or introduction of undue stresses on structure components.
- .5 Compliance with requirements of municipal, provincial, and federal Authorities regulating construction.
- .6 Deviation of levels and alignment: maximum deviation of structure in plan not more than 8 mm from one corner to the adjacent and opposite corner as required to align the structure on the new foundation.
- .7 Temporary connections, fastenings into existing wood members to remain that do not require drilling into wood members or components of the main barn to remain.
- .8 Building levels maintained and adjusted in conjunction with new foundation levels to the satisfaction of the Departmental Representative (DR).
- .8 Lifting and Moving suitable for proper installation of screw piles and grade beams for new foundation of Main Barn and West Addition.
- .9 Documentation, Tagging and Tracking measures that ensure proper reinstatement.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate period structure relocating procedures with scheduled work by archaeology and other trades to meet project schedule.
 - .2 Coordinate work of contractor engaged engineer, engineering inspections of Lift Plan, Bracing, Shoring, Lift equipment installation and placement, with subcontractors involved in lifting/moving operations to avoid delays, optimize project schedule and avoid damage to structure from lifting, mobbing operations.
- .2 Arrange a pre-construction meeting to:
 - .1 Inspect and review condition of structure to be relocated
 - .2 Review structural load limitations of existing structure
 - .3 Review schedule and verify availability of resources for lifting/moving.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Refer to Structural Construction Notes on Dwg. S1 to be read in conjunction with these specifications for requirements for engagement and review of professional engineer of bracing, shoring, lifting, moving as required to perform the work. Provide engineered shop drawings in accordance with Section 01 33 00 - Submittal Procedures, stamped and signed by professional engineer with relevant experience and registered or licensed in Province of Alberta, Canada.
- .3 Engineered Shop drawing submission to include lifting plan including systems, procedures, sequences, shoring, bracing, temporary framing plans, lifting points, temporary connections, sequencing, monitoring plan for movements, disconnection and reconnection of West Addition from and to the Main Barn, and scheduling requirements for contractor engineer site review.
- .4 Provide identification of numbering system and recording of photographs and dimensions for components to be temporarily removed.
- .5 Provide lifting and moving schedule in accordance with Section 01 33 00 - Submittal Procedures.
- .6 Submit record drawings in accordance with Section 01 33 00 - Submittal Procedures and Section 01 78 00 - Closeout Submittals.
- .7 Submit level survey of structure on existing foundation, base of wood structure, wood and concrete floor levels, both main barn and west addition, prior to lifting/moving and confirm with DR and levels indicated on plans. DR will review for final levels of structure including concrete and wood floor systems during construction.

1.4 REGULATORY REQUIREMENTS

- .1 Obtain necessary permits and regulatory approvals prior to commencing work.

1.5 EXISTING CONDITIONS

- .1 Refer to Contract Drawings showing existing conditions.
 - .1 Note that building is historical and the strength and integrity of some connections of built elements and members is unknown. Connections to be verified prior to lifting as stated in 3.2 PREPARATION. It is recommended the lifting and moving of the structure be done incrementally with review by the Shop Drawings Engineer and DR.

1.6 SCHEDULING

- .1 Submit schedule of activities, showing dates and duration to Departmental Representative no later than 15 days before lifting or moving work.
- .2 Co-ordinate moving procedure with scheduled work by archaeology and other trades, providing access and assistance as required.
- .3 Notify Departmental Representative in writing 5 working days before starting work, and before raising and moving, and before lowering structure, and on completion of work.

- .4 Lifting to be performed in increments if necessary to accommodate other work.
- .5 Contractor's engineer and DR to be present on site for all major lifts and moves.

1.7 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Temporary braces, tie-rods, clamps, straps, wood blocking, supports and crates: constructed in accordance with plans prepared by contractor. Take possession of items and remove from site at completion of work.
- .2 Lifting equipment including but not limited to Hydraulic Jacks, Railway or Toe Jacks, Air bags, Scaffolding, Teleposts.

2.2 ACCESSORIES

- .1 Provide equipment for safe moving, and careful transport, storage and re-founding of building and its related parts.
- .2 Provide equipment and supports suitable for support of entire structure without subsidence or collapse.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Before starting work verify existing conditions and variations from original contract documents and notify DR.
- .2 Ensure completion of protection and documentation/cataloguing requirements and security of artifacts and objects.
- .3 Ensure receipt of acceptance of Shop Drawing Submissions and Qualification submissions by the DR.

3.2 PREPARATION

- .1 North Elevation Wall. Verify completion of documentation, mold and subsequent removal of faux log parging prior to lifting, moving work.
- .2 Review extent of wood log decay exposed at North Wall Logs subsequent to faux log parging removal. Review with DR extent of settlement of north end of main barn attributable to wood decay. Record and account for decay related settlement in setting of top of new foundation at north end of barn, accounting for replacement of decayed logs with full size logs.

- .3 Perform and submit level survey of structure on foundation prior to lifting, moving. Level survey to include marking a level line centred on the ends of the logs to record existing position, location of logs.
- .4 Verify presence of connections or nails of intersecting walls that may be affected and stabilize during lifting or moving operations.
- .5 Review existing and proposed foundation levels with the DR. The north end of the barn has settled downward from the midpoint of the barn an amount greater than that of the south end relative to the midpoint of the barn. Objective is to equalize the variation in level between the mid-point of the barn and the north and south ends, taking into account the combination of foundation settlement as well as decay related settlement at the north end of barn. The intent is not correct settlement between the midpoint and ends of the barn due to original wood log shrinkage.
- .6 Support separate components securely to prevent damage. Lay movable items, flat during move. Protect with soft material separators
- .7 Initial Trial Lifting of Main Barn, North End to determine extent of re-levelling possible at north end of barn without damage.
- .1 Install initial bracing, strapping of structural elements, openings, ensuring that structure can still be lifted slowly at north end without damage.
- .2 Install lifting equipment under Barn per reviewed engineered shop drawings. Obtain site review and acceptance by engineer engaged for lifting/moving plan.
- .3 In presence of DR, carry out initial incremental lifting of the north end of the barn. Check structure at increments of 6 mm at a time, up to a maximum of 75 mm. Upon verification of no damage to structure proceed with completion of installation of remainder of temporary bracing and strapping.
- .8 Provide and install remainder of temporary braces, struts, tie rods, partitions, supports and other installations necessary for safe lifting and moving of structure to ensure integral preservation of existing materials, structure and connections during remainder of lifting and moving.
- .9 Temporarily block exterior openings during moving and storage.
- .10 Verify that water, gas, electricity, oil, telephone and other connected services are disconnected.
- .11 Ensure that temporary measures taken are reversible and no permanent unintended deformation or scaring of historic fabric result from this work.
- .12 Do not nail, drill holes or otherwise permanently alter historic building components that are to remain or be reinstated. Employ methods that do not utilize fastening into existing historic wood components.
- .13 Verify dimensions of new footings, foundations matching dimensions of moved building with tolerances.
- .14 Verify co-ordination of construction joints, support points in new foundations, key elevation points.

- .15 Prepare and submit structural monitoring plan. Monitoring plan to provide early warning to workforce and DR of any unintended movements of structure or components during lifting and moving operations.

3.3 PROTECTION

- .1 Protect existing structure elements and building fabric from damage.
 - .1 Submit method of protection with engineered shop drawings.
- .2 Catalogue and Photograph and label items related to structure, and its site, which may be displaced during course of work. Store these items with structure onsite.
- .3 Verify suitability of conditions for lifting and moving structure. Maintain continued structural stability during and after lifting and relocation.
- .4 Verify suitability of conditions at destination site before relocating, moving structure.
- .5 Obtain approval by Departmental Representative prior to commencing work.
- .6 Verify functioning of monitoring plan.

3.4 CONSERVATION PROCEDURES

- .1 Identification:
 - .1 Establish numbering system for components and mark numbered components on copy of drawings. Submit to Departmental Representative for review.
 - .2 Identify and mark detached pieces and structural components as they are found.
 - .3 Identify wooden items with lettering tape at two locations.
 - .4 Identify metal items with tags.
 - .5 Identify stones and masonry units with paint applied to surface not exposed to view when back in position.
 - .6 Attach visible and non-perishable labels and tags. Locate for easy access during storage and reconstruction.
 - .7 Prepare and produce photographic record of structure, before lifting, to facilitate reassembly.
- .2 Connections:
 - .1 Use clamping systems or other similar non-invasive methods to attach lifting, shoring, bracing, strapping devices to the historic structure.
 - .2 Do not nail, drill or in any way permanently alter the historic structure during the lifting process.
- .3 Dismantling:
 - .1 Remove components and structural parts in sequence.
 - .2 Place components in storage in clear relation to one another.
 - .3 Place visible non-perishable labels on components during storage.
- .4 Transportation:
 - .1 Follow procedure accepted by Departmental Representative for structure moving and storage. Proceed according to approved schedule to completion.

- .2 Once Structure has been moved, remove and reinstate temporary bracing, shoring as required to perform the specified log repair, replacement work, and any other work done while the barn is moved on its temporary location.
- .3 Prior to moving structure back on new foundation, ensure that all bracing, shoring is in place and reviewed on site by Contractor Shoring engineer.

3.5 RE-INSTALLATION

- .1 Ensure new foundation has been properly prepared. Verify the site will accept the moved structure.
- .2 Verify top of new foundation levels in concrete and stone prior to final lowering of building onto new foundation. Carry out any final adjustments top of foundation to ensure full bearing of base of wood structure on foundation.
- .3 Plan and co-ordinate activities of related trades before work of final installation starts.
- .4 Install structure at destination location. Reconnect West Addition structure only after acceptance of work on Main Barn.
- .5 Leave temporary bracing, closures and other installations for moving in place until removal is authorized, in writing, by DR.
- .6 Review structure for any damage, and submit repair plan to DR for review. Make good any damage using treatments accepted by DR.

3.6 CLEANING

- .1 Structure:
 - .1 Remove temporary marking tags, and labels from completed work.
- .2 Original site:
 - .1 Clear debris and ensure site is in neat and safe condition.
 - .2 Ensure site is clean and restored to its original state.
- .3 Destination site:
 - .1 Remove unattached materials and equipment; leave site in clean and safe condition.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Contractor to comply with requirements of this Section when performing the following work on red, white, brown or beige surface paint coats found on the Workhorse Barn building:
 - .1 Removal of lead-based paints from both interior and exterior wall and ceiling surfaces of the Workhorse Barn as indicated on drawings by scraping or sanding using non-powered hand tools.
- .2 Contractor to ensure that lead removal work will not destroy the heritage nature of the remaining building materials not to be impacted as part of project scope.

1.3 REFERENCE STANDARDS

- .1 Department of Justice Canada
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .2 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS 2015), Safety Data Sheets (SDS).
- .3 Human Resources and Social Development Canada (HRSDC)
 - .1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.
- .4 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 U.S. Environmental Protection Agency (EPA)
 - .1 EPA 747-R-95-007-1995, Sampling House Dust for Lead.
- .6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).
- .7 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances
 - .1 Lead in Construction Regulation - 29 CFR 1926.62-[1993].
- .8 Underwriters' Laboratories of Canada (ULC)

1.4 DEFINITIONS

- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Authorized Visitors: Departmental Representative or designated representative and representatives of regulatory agencies.

- .3 Occupied Area: areas of building or work site that is outside Work Area.
- .4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .5 Airlock: ingress or egress system, without permitting air movement between contaminated area and uncontaminated area. Consisting of two curtained doorways at least 2 m apart.
- .6 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another. Typically constructed as follows:
 - .1 Place two overlapping polyethylene sheets over existing or temporarily framed doorway, securing each along top of doorway, securing vertical edge of one sheet along one vertical side of doorway, and secure other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and add weight to bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings 1.5 m on each side.
- .7 Action level: employee exposure, without regard to usage of respirators, to an airborne concentration of lead of 50 micrograms per cubic metre of air calculated as 8 hour time-weighted average (TWA). Intermediate precautions for lead abatement are based on airborne lead concentrations greater than 0.05 milligrams per cubic metre of air within Work Area.
- .8 Competent person: Individuals, Departmental Representative capable of identifying existing lead hazards in workplace and taking corrective measures to eliminate them.
- .9 Lead in Dust: wipe sampling on vertical and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.
- .3 Provide: Provincial requirements for Notice of Project Form, as well as Exposure Control Plan and Safe Work Procedures.
- .4 Provide proof of Contractor's General and Environmental Liability Insurance.
- .5 Quality Control:
 - .1 Provide Departmental Representative necessary permits for transportation and disposal of lead based paint waste and proof that it has been received and properly disposed.
 - .2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, entry and exit from Work Area, and aspects of work procedures and protective measures.
 - .3 Provide proof that supervisory personnel have attended lead abatement course, of not less

than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.

- .6 Product data:
 - .1 Provide documentation including test results, fire and flammability data, and Safety Data Sheets (SDS) for chemicals or materials including:
 - .1 Encapsulants.
 - .2 Amended water.
 - .3 Slow drying sealer.
 - .4 Spray adhesives.
 - .5 Chemical gel paint stripper, if applicable.
- .7 Submit proof that all HEPA-filtered equipment (vacuums and negative air units) to be used have undergone and successfully passed a DOP (Dispersed Oil Particulate) test.
- .8 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (qualitative test) with respirator that is personally issued.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Perform construction occupational health and safety in accordance with Section 01 35 29.14 - Health and Safety for Contaminated Sites.
 - .2 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers and visitors in Work Area includes:
 - .1 Respirator NIOSH approved and equipped with filter cartridges with assigned protection factor of 10, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure in Lead Work Area. Provide sufficient filters so workers can install new filters following disposal of used filters and before re-entering contaminated areas.
 - .2 Disposable type protective clothing (TYVEK coverall) that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.
 - .2 Requirements for workers:
 - .1 Remove street clothes in clean change room and put on respirator with new filters or reusable filters, clean coveralls and head covers before entering Equipment and Access Rooms or Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.
 - .2 Remove gross contamination from clothing before leaving work area. Place contaminated work suits in receptacles for disposal with other lead - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. When not in use in Work Area, store work

- footwear in Equipment and Access Room. Upon completion of lead abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from Work Area or from Equipment and Access Room.
- .3 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers not to use this system as means to leave or enter work area.
 - .3 Eating, drinking, chewing, and smoking are not permitted in Work Area.
 - .4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual lead abatement.
 - .5 Ensure workers wash hands and face when leaving Work Area. Facilities for washing to be provided by the Contractor. Wash pails with clean water and rags are acceptable.
 - .6 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
 - .7 Ensure no person required to enter Work Area has facial hair that affects seal between respirator and face.
 - .8 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to Work Areas.
 - .2 Instruct Authorized Visitors in use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse, recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .3 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- .4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.
- .5 Any lead waste material not previously tested for lead leachability (TCLP test) must be identified and segregated for further analysis by the Departmental Representative before offsite disposal.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are in the Appendix of this specification.
- .2 Notify Departmental Representative of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until

instructed by Departmental Representative.

1.9 SCHEDULING

- .1 Not later than three days before beginning Work on this Project notify the following in writing, where appropriate:
 - .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - .2 Provincial Safety Authority.
 - .3 Disposal Authority.
- .2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.
- .3 Provide Departmental Representative copy of notifications prior to start of Work.

1.10 HOURS OF WORK

- .1 Typical work schedule - perform work after normal working hours at the Workhorse Barn and Bunkhouse buildings. Include in Contract Sum additional costs due to this requirement. Be available to work continuously from beginning to end of project.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene: 0.15 mm unless otherwise specified; in sheet size to minimize joints.
- .2 FR polyethylene: 0.15 mm woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- .4 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for trapping residual lead paint residue.
- .5 Lead waste containers: metal type acceptable to dump operator with tightly fitting covers and 0.15 mm sealable polyethylene liners.
 - .1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

Part 3 Execution

3.1 SUPERVISION

- .1 Approved Supervisor must remain within Lead Work Area during disturbance, removal, or other handling of lead-based paints.

3.2 PREPARATION

- .1 Remove and wrap items to be salvaged or reused, and transport and store in area

specified by Departmental Representative.

- .2 Work Area:
 - .1 Mark or tag any remaining live electrical systems inside of the intended work areas.
 - .2 Pre-clean fixed casework, and equipment within work areas, using HEPA vacuum and cover with polyethylene sheeting sealed with tape.
 - .3 Clean work areas of general dust/debris using HEPA vacuum. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum.
 - .4 Seal off openings, corridors, doorways, windows with polyethylene sheeting sealed with tape.
 - .5 Cover floor surfaces in work area from wall to wall with FR polyethylene drop sheets to protect existing floor or outside ground surfaces during removal.
 - .6 Build airlocks at entrances and exits from interior work areas to ensure interior work areas are always closed off by one curtained doorway when workers enter or exit.
 - .7 At point of access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used:
 - .1 CAUTION LEAD HAZARD AREA (25 mm).
 - .2 NO UNAUTHORIZED ENTRY (19 mm).
 - .3 WEAR ASSIGNED PROTECTIVE EQUIPMENT AND RESPIRATOR (19 mm).
 - .4 BREATHING LEAD CONTAMINATED DUST CAUSES SERIOUS BODILY HARM (7 mm).
 - .8 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authority having jurisdiction.
 - .9 Where water application is required for wetting lead containing materials, provide temporary water supply by use of appropriately sized hoses for application of water as required.
 - .10 Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.
- .3 Worker Decontamination Enclosure System:
 - .1 Worker Decontamination Enclosure System includes Equipment and Access Room and Clean Room, as follows:
 - .1 Equipment and Access Room: construct between exit and work areas, with two curtained doorways, one to the rest of suite, and one to work area. Install waste receptor and storage facilities for workers' shoes and protective clothing to be re-worn in work areas. Build large enough to accommodate specified facilities, equipment needed, and at least one worker allowing sufficient space to change comfortably.
 - .2 Clean Room: construct with curtained doorway to outside of enclosures. Provide lockers or hangers and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.

- .4 Construction of Decontamination Enclosures:
 - .1 Construct framing for enclosures or use existing rooms. Line enclosure with polyethylene sheeting and seal with tape, apply two layers of FR polyethylene on floor.
 - .2 Construct curtain doorways between enclosures so when people move through or waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
 - .3 For exterior work, decontamination enclosure can be achieved using portable pop-up DCON units.
- .5 Separation of Work Areas from Occupied Areas
 - .1 Barriers between Work Area and occupied area to be constructed as follows:
 - .1 Construct floor to ceiling cover with polyethylene sheeting and seal with duct tape. Seal joints and between adjacent materials with duct tape, to create airtight barrier.
 - .6 Maintenance of Enclosures:
 - .1 Maintain enclosures in clean condition.
 - .2 Ensure barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately.
 - .3 Visually inspect enclosures at beginning of each work day.
 - .4 Use smoke test method to test effectiveness of barriers as directed by Departmental Representative.

3.3 LEAD - BASE PAINT ABATEMENT

- .1 Removal of lead-based paint to be performed by scraping or sanding using non-powered hand tools.
- .2 Remove lead-based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labeled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure containers are removed from Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.
- .4 After completion of stripping work, wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet. No wire brushes are to be used.
- .5 After wet sponging to remove visible lead-based paint, and after encapsulating lead containing material impossible to remove, wet clean work area including equipment and access room, and equipment used in process. After inspection by Departmental Representative, apply continuous coat of slow drying sealer to surfaces. Lock down agent must be compatible with paint products and must not affect penetration of paint into wood. Do not disturb work for 8 hours with no entry, activity, ventilation or disturbance during this period.
- .6 After enclosing lead painted surfaces, wet clean work area and equipment and access

room. During settling period no entry, activity, or ventilation will be permitted.

3.4 INSPECTION

- .1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative will result in work stoppage, at no cost to Departmental Representative.
- .2 Departmental Representative will inspect work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .3 When lead dust leakage from Work Area occurs Departmental Representative may order Work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 LEAD SURFACE SAMPLING - WORK AREAS

- .1 Final lead surface sampling to be conducted as follows:
 - .1 After Work Area has passed a visual inspection for cleanliness approved by Departmental Representative and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period of 8 hours has passed. Departmental Representative will perform lead wipe sampling in Work Area.
 - .1 Final lead wipe sampling results from horizontal and vertical surfaces where lead-based paints have been removed must show lead levels of less than 40 micrograms of lead in dust per square foot. Samples must be collected and analyzed in accordance with EPA 747-R-95-007.
 - .2 If wipe sampling results show levels of lead in excess of 40 micrograms per square foot, re-clean work area at contractor's expense and apply another acceptable coat of lock-down agent to surfaces.
 - .3 Repeat as necessary until levels are less than 40 micrograms per square foot.

3.6 FINAL CLEANUP

- .1 Following specified cleaning procedures, and when lead wipe sampling is below acceptable concentrations proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to center of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum equipment.
- .3 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labeled waste containers for transport.
- .4 Clean-up Work Areas, Equipment and Access Room, and other contaminated enclosures.
- .5 Clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.

- .6 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.7 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American Conference of Governmental Industrial Hygienists (ACGIH), Bioaerosols Assessment and Control 1999.
- .2 Health Canada WHMIS 2015
 - .1 Safety Data Sheets (SDS).
- .3 New York City Department of Health - Bureau of Environmental and Occupational Disease Epidemiology's Guidelines on the Assessment and Remediation of Fungi in Indoor Environment 2000.
- .4 United States Department of Labor Occupational Safety and Health Administration (OSHA)
 - .1 29 CFR 1910.134 - Respiratory Protection.
 - .2 29 CFR 1910.1200 - Hazard Communication.
- .5 United States Environmental Protection Agency (EPA), Mould Remediation in Schools and Commercial Buildings, 2008.
- .6 Alberta Health Services – Hantavirus Guidelines
- .7 Government of Alberta – Workplace Health and Safety: Hantavirus

1.2 DEFINITIONS

- .1 Authorized Visitors: Departmental Representative and representative of regulatory agencies.
- .2 Cleaning solution: detergent solution or biological disinfectant solution.
- .3 Competent person: Individuals, Departmental Representative who can demonstrate that mould and/or rodent feces remediation training has been obtained, is capable of identifying existing microbial or biological hazards in workplace and selecting appropriate control strategy for microbial exposure.
- .4 Contractor: remediation contractor providing demolition and removal services as defined in specification.
- .5 Fibre Reinforced Polyethylene Sheet: rip-proof fibre reinforced polyethylene sheeting with added fibre reinforced adhesive tape along edges.
- .6 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .7 Mould or Rodent Feces contaminated work area: specific area or location where actual work is being performed or other areas of facility where it has been determined that it may be hazardous to public health as result of mould or rodent feces remediation.
- .8 Occupied Area: areas of building or work site that is outside mould or rodent feces

contaminated work area.

- .9 PPE: Personnel Protection Equipment.
- .10 Sprayer: airless spray equipment capable of producing mist or fine spray. Must have a minimum of twenty liter capacity for work.

1.3 REGULATORY REQUIREMENTS

- .1 Comply with regulations in effect at time work is performed. In case of conflict among these requirements or with these specifications the more stringent requirement applies. If no regulations exist, follow guidelines most widely accepted by recognized professional organizations such as occupational hygienists, health professionals or environmental engineers as listed in paragraph 1.2 Referenced Standards.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit Provincial and/or local requirements for Notice of Project form.
- .2 Submit proof of Contractors Liability Insurance for dealing with hazardous materials.
- .3 Submit Workers Compensation Board status and transcription of insurance.
- .4 Submit proof of attendance in form of certificate that supervisory personnel have been trained in hazardous material remediation course, approved by Departmental Representative. Minimum of one supervisor for every ten trained workers.

1.5 CLOSEOUT SUBMITTALS

- .1 Maintain general log to provide permanent record of project. Maintain logs and other required documentation as part of permanent project file.
- .2 Daily log must be available for inspection upon request by Departmental Representative.
- .3 Visitor log must be available for inspection upon request by Departmental Representative.

1.6 INSTRUCTION AND TRAINING

- .1 Health and Safety:
 - .1 Perform construction occupational health and safety in accordance with Section 01 35 29.14 - Health and Safety for Contaminated Sites.
- .2 Before commencing work, provide proof that worker had instruction and training in potential health hazards of mould and rodent feces exposure, handling of hazardous materials, in personal hygiene including protective clothing, in entry and exit from a Contaminated Work Area, and in use of disposal procedures including building materials. This training can be performed as part of a program to comply with requirements of the OHSA Hazard Communication Standard (29 CFR 1910.1200), equivalent.
- .3 Instruction and training related to respirators includes at minimum:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.

- .3 Disinfecting of equipment.
- .4 Limitations of equipment.
- .4 Instruction and training must be provided by designated construction safety advisor.

1.7 WORKER PROTECTION

- .1 Respirators suitable for protection against mould or rodent feces and acceptable to Provincial Authority having jurisdiction Non-powered half-face equipped with replaceable HEPA filter/Organic Vapour cartridges, personally issued to work and marked as to efficiency and purpose.
- .2 Gloves and eye protection.
- .3 Disposable (TYVEK) coveralls including head covering.
- .4 Ensure that no person required to enter a Contaminated Work Area has facial hair that affects seal between respirator and face.
- .5 Eating, drinking and chewing are not permitted in a Contaminated Work Area.
- .6 Before leaving a Contaminated Work Area, dispose of protective clothing as waste as specified.
- .7 Ensure workers wash hands and face after leaving a Contaminated Work Area. Facilities for washing are to be provided by the Contractor.

1.8 VISITOR PROTECTION

- .1 Protective clothing and approved respirators, non-powered half-face with eye protection, to be worn by Authorized Visitors to a Contaminated Work Area.
- .2 Instruct Authorized Visitors in use of protective clothing, respirators, and procedures.
- .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from a Contaminated Work Area.

1.9 HOURS OF WORK

- .1 Typical work schedule - perform work after normal working hours at the Workhorse Barn and Bunkhouse buildings. Include in Contract Sum additional costs due to this requirement. Be available to work continuously from beginning to end of project.

Part 2 Products

2.1 MATERIALS

- .1 Drop Sheets: fibre reinforced polyethylene 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Disposal bags: dust-tight 0.15 mm clear polyethylene waste bags.
- .3 Wetting Agent: water to mist mould-containing material.

- .4 Cleaning solution: detergent solution or biological disinfectant solution for damp wipe and/or mop.
- .5 Fibre reinforced adhesive tape: used in sealing joints of fibre reinforced polyethylene sheets and for attachment of fibre reinforced polyethylene sheet to finished and unfinished surfaces. Fibre reinforced adhesive tape must be capable of adhering under both dry and wet conditions.
- .6 Materials: provide materials such as fibre reinforced polyethylene sheeting, lumber, nails and hardware necessary to construct and dismantle barriers that isolate Contaminated Work Areas.

2.2 TOOLS AND EQUIPMENT

- .1 Tools and equipment: suitable for use with microbial contamination and must be able to withstand de-contamination.
- .2 Personnel protective equipment (protective clothing, personal respiratory filter cartridges, HEPA air filters, etc.): to be provided in sufficient quantities for duration of project.
- .3 Vacuum cleaners: equipped with HEPA filters.
- .4 Ladders and/or scaffolds: adequate length, strength and sufficient quantity to support work schedule.
- .5 Exhaust air fan systems: equipped with HEPA filters and be capable of providing sufficient exhaust air to create a minimum pressure differential of 5 to 7 Pa and to allow sufficient flow of air through area.

Part 3 Execution

3.1 PREPARATION OF MOULD CONTAMINATED WORK AREA

- .1 Contaminated Work Area and areas adjacent and around area to be unoccupied.
- .2 One supervisor for every ten trained workers is required.
- .3 Approved supervisor must remain within Contaminated Work Area at all times during disturbance, removal or other handling of mould and rodent feces contaminated materials.
- .4 Seal off windows, doorways, and other openings between Contaminated Work Areas and uncontaminated areas outside Contaminated Work Areas with fibre reinforced polyethylene sheeting and fibre reinforced adhesive tape to minimize migration of contaminants to other parts of building.
- .5 Clean movable objects within proposed Contaminated Work Area using HEPA filtered vacuum equipment, damp wipe surfaces and remove such objects from Contaminated Work Area to a secure and clean area.
- .6 Clean fixed objects within proposed Contaminated Work Area using HEPA filtered vacuum, damp wipe surfaces and cover with one layer of fibre reinforced polyethylene

sheeting securely fastened with fibre reinforced adhesive tape.

- .7 Remove visible dust from surfaces in Contaminated Work Area where dust is likely to be disturbed during course of remediation work. Use HEPA vacuum and damp wipe the area.
- .8 Do not use compressed air to clean up or remove dust from any surface.
- .9 Erect critical barriers around perimeter of Contaminated Work Area before remediation using single layer of 0.15 mm fibre reinforced polyethylene sheeting extending from floor slab to ceiling. Seal gaps with layer of 0.15 mm fibre reinforced polyethylene sheeting.
- .10 Ensure that containment area is under negative pressure. Use HEPA filtered fan exhausted outside of Contaminated Work Area to create negative pressure.
- .11 Before beginning work, at each access to contaminated work area, install warning signs in both official languages in upper case 'Helvetica Medium' letters reading as follows, where number in parentheses indicates font size to be used : 'CAUTION MOULD HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING MOULD DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'. Additional signage to be created and installed by the contractor for notification of airborne biological hazard risks.
- .12 Do not begin remediation work until barriers are inspected and authorization is given by Departmental Representative.

3.2 MICROBIAL REMEDIATION

- .1 Use airless sprayer (low-velocity, fine-mist) to mist (not wet) materials containing mould and rodent feces to be cleaned. Perform work to reduce dust creation to lowest levels practicable.
- .2 Non-porous and semi-porous materials can be cleaned using the cleaning solution and reused depending on depth to which microbial growth has penetrated substrate. Wood to be discarded if fungal growth has affected its soundness. Wood with rodent feces contamination is to be cleaned and disinfected but not disposed unless direction given otherwise by the Departmental Representative.
- .3 Dispose of contaminated building materials as specified.
- .4 During remediation, should Departmental Representative suspect contamination of areas outside enclosed Contaminated Work Area, Contractor to stop remediation work and immediately decontaminate affected areas. Eliminate causes of such contamination. Prohibit unprotected individuals from entering these contaminated areas until air and swab sampling and a visual inspection determines areas are free from contamination.

3.3 REPAIR AND CLEAN-UP

- .1 During remediation and immediately after completion of remediation, clean enclosure starting within top of enclosure and working down to floor. Clean areas using HEPA vacuum and by damp mopping with cleaning solution. Every effort is to be made to remove rodent feces build-up from within wall openings by carefully removing the bottom wall plank to gain access. Using airless sprayer, spray disinfectant solution from the top

of the wall downwards to the bottom. Once complete, use the HEPA vacuum to remove all feces from the wall opening. This is to be repeated for all wall cavities.

- .2 Perform restoration of designated Contaminated Work Area as specified. All visible openings from the outside into the buildings is to be patched/repared to prevent future rodent impacts.
- .3 Leave areas dry and visibly free from contamination, debris and dust.
- .4 After clean-up within barrier dismantle, barrier and dispose of as specified.
- .5 Perform final thorough clean-up of work areas and adjacent areas affected by work using HEPA vacuum and damp mopping with cleaning solution.

3.4 WASTE DISPOSAL

- .1 Place mould and rodent feces waste in doubled-bagged dust-tight 0.15 mm fibre reinforced clear polyethylene waste bags. Treat drop sheets and disposable protective clothing as waste; fold these items to contain dust, and place in plastic bags. Securely seal bags.
- .2 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum prior to removal from Contaminated Work Area.
- .3 Remove waste bags from site and dispose. There are no special requirements for disposal of mould or rodent feces materials, as such they can be disposed of in landfill.

3.5 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 Return objects moved to temporary locations to their location. Ensure objects are cleaned before been moved into cleaned areas.
- .2 Re-install bottom wall plank boards removed from wall openings.
- .3 Re-establish mechanical and electrical systems to proper working order.

3.6 FINAL CLEARANCE

- .1 Departmental Representative to conduct thorough visual inspection to detect visible accumulations of dust or bulk materials remaining in work area. Should dust, debris, microbial contamination, or residue be detected repeat cleaning, until area meets approval.
- .2 Before and after work, take air samples inside of Mould Contaminated Work Area enclosures in accordance with recommended guidelines.
- .3 Perform final air monitoring of Mould Contaminated Work Area provided area has passed visual inspection and an appropriate settling period of 12 hours has passed. If air monitoring results are deemed unacceptable by Departmental Representative areas are to be re-cleaned with HEPA vacuum and damp wiped until levels are found to be acceptable by Departmental Representative.

END OF SECTION

PART 1 General

1.1 REFERENCE STANDARDS

- .1 CSA International
 - .1 CSA A23.1/A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 – General Instructions.
- .2 Submit means and methods of north side heritage slab lifting, placement on temporary supports suitable to carry out repairs on, dowelling installation, and reinstatement at completion of works on barn structure.
- .3 Site Quality Control Submittals.
 - .1 Submit three (6) samples of each prepared combination of aggregate blends and pigment. Match appearance and texture of existing concrete as closely as possible.
Crack Repair Mix: Two (2) sets of 100 x 100 x 25 samples for each of three (3) blends of aggregate and colouring agent
 - .2 Concrete Quality Control Procedures: Submit minimum two (2) weeks prior to start of concrete work quality control procedures for mixing, surface preparation, placement and curing.

1.3 CLOSEOUT SUBMITTALS

- .1 Maintain accurate records in accordance with Section 01 78 00 – Closeout Submittals.

1.4 QUALITY ASSURANCE

- .1 Site Quality Control Samples.
 - .1 Samples reviewed for colour and texture match with existing concrete, including appearance, size and colour of aggregate.
 - .2 Samples for each mix type for quality control reference for the duration of the work.
 - .3 Contractor must demonstrate experience and skills in historic concrete repairs, on-site manual customized mixes and application, finishing and curing.

1.5 AMBIENT CONDITIONS

- .1 Provide min 10 degrees C for concrete repair.
- .2 Avoid heating concrete locally.
- .3 Avoid drying concrete excessively.
- .4 Avoid high temperature and dry heating within enclosures.

1.6 EXISTING CONDITIONS

The existing concrete slab to be repaired is heritage fabric and must be protected from damage during entire repair process.

PART 2 Products

2.1 DESIGN CRITERIA

- .1 Concrete repair products: to CSA A23.1/A23.2, and as described in Mixes of PART 2 – PRODUCTS:

2.2 PERFORMANCE CRITERIA

- .1 For duration of warranty periods the following performance criteria apply to the concrete repairs:
 - .1 Repair does not debond from existing substrate.
 - .2 Repair does not develop shrinkage cracking within the repair patch.

2.3 MATERIALS

- .1 Portland Cement: to CSA A3001, Type GU.
 - .2 Lime: Hydrated Lime Type SA to ASTM C207.
 - .3 Water: potable, to CSA A23.1.
 - .4 Fine aggregate for Concrete Crack Repair Mix:
 - .1 Washed and graded to meet the following:
 - .1 4% No. 18 sieve.
 - .2 16% No. 25 sieve.
 - .3 32% No. 30 sieve.
 - .4 18% No. 35 sieve.
 - .5 30 % under No. 35 sieve.
 - .6 Discard material coarser than No. 18 sieve.
 - .2 Clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam and other deleterious substances.
 - .5 Concrete Mix Colouring Agent: Mineral Oxide Pigment to ASTM C979 maximum 10% mass of cement, or crushed granite aggregate.
 - .6 Curing compounds: compatible with applied finish on concrete.
 - .7 Pinning repair dowels for North Historic Slab Repair: 600 mm long, 16mm diameter Glass Fiber Reinforced Polymer (GFRP) rods to CSA S-807, bar size as indicated on drawings.
 - .8 Epoxy Adhesive: high strength two-part epoxy adhesive suitable for wet application.
 - .1 Acceptable Materials:
 - .1 Hilti RE-500 or approved equivalent.
 - .9 Cement Slurry bonding agent. 1 part Cement to 1 part water mix.
 - .10 Not permitted: Pre-mix high strength concrete repair mortar products.
-

2.4 MIXES

- .1 Crack Repair Mix: 1 part Portland cement, ½ part SA lime, 4.5 parts fine aggregate, pigment to suit maximum 10% mass of cement.

PART 3 Execution

3.1 VERIFICATION OF CONDITIONS

- .1 Verify existing conditions are as indicated on Contract Drawings.
- .2 Notify Departmental Representative of conditions not indicated on Contract Drawings.

3.2 PROTECTION OF IN-PLACE CONDITIONS

- .1 Provide protection measures to existing structures suitable for the scope of the Work.
- .2 Protect exposed concrete, exposed masonry and exposed members from staining and from becoming coated with concrete leakage from concreting operations.
- .3 Protect wood flooring from physical damage and water damage at all times. As a minimum, protection must include complete protective cover over entire floor.

3.3 EXAMINATION

- .1 Examine areas where concrete repairs are indicated on Contract Drawings.
 - .1 Visually inspect and hammer tap areas.
 - .2 Confirm areas of deteriorated and delaminated concrete.
 - .3 Mark these areas on drawings and on concrete surface with suitable marking crayon.
- .2 Confirm areas for removal and repair.
- .3 Obtain approval from Departmental Representative confirming areas of repair.
- .4 Mark areas of repair on as-built/record drawings.

3.4 PREPARATION AND REPAIR

- .1 Confirm areas for repair.
 - .2 Obtain approval from Departmental Representative confirming areas of repairs.
 - .3 Protect brand markings from damage during entire repair process.
 - .4 Clean concrete surfaces.
 - .1 Remove dirt, debris, loose concrete, existing coatings and stains.
 - .2 Use gentlest means of cleaning first: soap and water, wire brush, hand tools, pressure wash, mechanical tools.
 - .3 Avoid damaging adjacent surfaces.
-

- .4 Chemical cleaning is not permitted.
- .5 Remove existing areas of spalling, cracked, delaminated and debonded concrete down to sound material.
- .6 Ensure slab sections are well supported off the ground in temporary location for carrying out repair and pinning together of slab.
- .1 Confirm pin locations, and location of drill holes and direction with Departmental Representative. Pins to be drilled on diagonal and into wall on diagonal.
- .2 Drill holes for pins by core drill method. Hammer Drills not permitted.
- .3 Set Pins in epoxy adhesive,
- .7 Bond coat on concrete repair area: Brush cement slurry bonding agent onto cleaned concrete surface. Completely cover surfaces of exposed reinforcing.
- .8 Mix patching material with selected blend of aggregates.
- .9 While cement slurry bonding agent is still tacky:
 - .1 Fill repair area with concrete repair mix to the appropriate surface depth for the repair type.
 - .2 Fill area in individual lifts to suit depth of repair area.
 - .3 Do not float with steel trowels.
 - .4 Apply brush texture finish.
- .10 Wet Cure for repair areas.
 - .1 Wet cure period: minimum seven (7) days.
 - .2 Cover repaired surfaces of concrete with single layer of clean, pre-soaked burlap. Cover only as soon as surface will not be marred by covering.
 - .3 Keep fabric wet with soaker hoses.
 - .4 Keep curing system in place for specified time period.

3.5 CLEANING

- .1 Clean in accordance with Section 01 00 10 – General Instructions.

END OF SECTION

1 GENERAL

1.1 REFERENCE STANDARDS

- .2 CSA Group (CSA)
 - .1 CSA A23.1-[14]/A23.2-[14], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA O86-[14], Engineering Design in Wood.
 - .3 CSA O121-[08(R2013)], Douglas Fir Plywood.
 - .4 CSA O151-[09(2014)], Canadian Softwood Plywood.
 - .5 CSA S269.1-[16], Falsework and Formwork.
 - .6 CAN/CSA S269.3-[M92(R2003)], Concrete Formwork.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Submit shop drawings for formwork [and falsework].
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in [Province] [Territory], Canada.
 - .2 Prepare Shop Drawings in accordance with CSA S269.1 for formwork and falsework.
 - .3 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
 - .4 Indicate sequence of erection and removal of formwork/falsework.
 - .5 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts.
 - .6 Indicate sequence of erection and removal of formwork and falsework.
 - .7 Include the following information on falsework Shop Drawings:
 - .1 Longitudinal, lateral, vertical, dead, live and impact loads used in design.
 - .2 Safe bearing capacity of soil underneath mud sills.
 - .3 Sequence, methods and rate of concrete placement.
 - .4 Details and locations of splices.

1.3 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section [01 45 00 - Quality Control].
- .2 Retain the Shop Drawing P.Eng to conduct on-site inspections and prepare and submit inspection reports verifying this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section [01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions].
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:

- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect formwork from damages.
- .3 Replace defective or damaged materials with new.

2 PRODUCTS

2.1 MATERIALS

- .1 Formwork materials:
 - .1 Use wood and wood product formwork materials to [CAN/CSA O86]
- .2 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes in concrete surface.
- .3 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121
- .4 Form release agent: Proprietary, non volatile material not to stain concrete or impair subsequent application of finishes or coatings to surface of concrete, derived from agricultural sources, non petroleum containing, [non-toxic,] [biodegradable,] [low VOC,].
- .5 Falsework materials: to CSA S269.1.
- .6 Sealant: to Section 07 92 00 - Joint Sealants.

3 EXECUTION

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels, and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Verify sub-grade soil condition is ready for formwork installation.
- .3 Verify helical pile installation is ready for formwork installation.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 Fabricate and erect formwork in accordance with CAN/CSA S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.
- .9 Align form joints and make watertight.
 - .1 Keep form joints to minimum.

- .10 Locate horizontal form joints for exposed columns [2400] mm above finished floor elevation.
- .11 Use 25 mm chamfer strips on external corners and 25 mm fillets at interior corners, joints, unless specified otherwise.
- .12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .13 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .15 Line forms for following surfaces:
 - .1 Outer face of grade beams, curb beams and vertical edge of aisle slab.
 - .2 Ensure lining is new and not reused material.
 - .3 Ensure lining is dry and free of oil when concrete is poured.
 - .4 Application of form release agents on formwork surface is prohibited where drainage lining is used.
 - .5 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
- .16 Clean formwork in accordance with CSA A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for 5 days after placing concrete.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 American Concrete Institute (ACI):
 - .1 SP-66-04, ACI Detailing Manual 2004.
- .2 ASTM International:
 - .1 ASTM A1064/A1064M-15 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - .2 ASTM A123/A123M-15 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A 143/A 143M-07(2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
- .3 CSA International:
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 A23.3-14 - Design of Concrete Structures.
 - .3 CSA-G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.
 - .4 G40.20-13/G40.21-13 - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
- .4 Reinforcing Steel Institute of Canada (RSIC):
 - .1 RSIC – 2004, Reinforcing Steel Manual of Standard Practice.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC-2004 Reinforcing Steel Manual of Standard Practice and SP-66(04) ACI Detailing Manual-2004.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
 - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
 - .1 Provide Type A tension lap splicers unless otherwise indicated.

1.3 QUALITY ASSURANCE

- .1 Submit in accordance with Section 01 45 00 - Quality Control.
- .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel.
- .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
 - .2 Reinforcing steel for Concrete Grade Beams and Concrete Curb Beams: billet steel, weldable low alloy, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
 - .3 Cold-drawn annealed steel wire ties: to ASTM A 82/A 82M.
 - .4 Reinforcing bars for Concrete Aisle Slab as well as dowels where indicated: Glass Fiber Reinforced Polymer (GFRP) rod to CSA S-807, Grade II bar. Size 16mm per Contract Drawings.
 - .5 Stainless Steel Dowels: Stainless Steel threaded bars – Grade 316 to ASTM A276.
 - .6 Non-ferrous chairs, bolsters, bar supports, spacers: in accordance with CSA A23.1/A23.2.
 - .7 Polyethylene film for BondBreak: 0.25 mm thick polyethylene sheet to CAN/CGSB-51.34.
 - .8 Epoxy Adhesive: high strength two-part epoxy adhesive suitable for wet application.
 - .1 Acceptable Materials:
 - .1 Hilti RE-500 V3,
 - .2 Simpson SET-XP High Strength Epoxy Adhesive,
 - or approved equivalent.
-

- .9 Cement Slurry bonding agent. 1 part Cement to 1 part water mix.

2.2 FABRICATIONS

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, SP-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
 - .1 SP-66 unless indicated otherwise.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

- .1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 EXECUTION

3.1 PREPARATION

- .1 Confirm reinforcement type and placement with Departmental Representative

3.2 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

- .1 Where GFRP is specified on Drawings, install new GFRP reinforcement in accordance with CSA S-806. Minimum lap length of 40 bar diameters is required.
 - .1 Place new GFRP reinforcement where indicated on Contract Drawings.
 - .2 Ensure reinforcement is clean and free from oil and deleterious matter.
 - .3 Secure GFRP reinforcement in formwork.
 - .4 Field cutting: do not shear GFRP bars.
-

- .2 Cut bars with fine blade saw or grinder, with carborundum or diamond blade.
- .3 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .4 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .5 Ensure cover to reinforcement is maintained during concrete pour.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement, blended hydraulic cement with silica fume.
 - .1 Type GUb 10SF cement.
- .2 Reference Standards:
 - .1 ASTM International
 - .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-11 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M-15a Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C1017/C1017M-13e1 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86 (R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .3 CSA International
 - .1 A23.1-14/A23.2-14 - Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
 - .2 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart, convene pre-installation meeting one week prior to beginning concrete works.
- .1 Ensure key personnel, site supervisor, Departmental Representative, specialty contractor - finishing, forming attend.
 - .1 Verify project requirements.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 At least 2 weeks prior to beginning Work, provide Departmental Representative with concrete mix designs for each class of concrete specified.
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- .3 Provide testing results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete records: provide accurate records of concrete items cast indicating date and location of placement, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .5 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 90 minutes for concrete to be delivered to site of Work and discharged after batching.
- .6 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

1.4 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
 - .2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
 - .3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishing.
 - .6 Formwork removal.
 - .7 Joints.
 - .4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.
 - .6 Submit concrete delivery slips in accordance with CSAA23.1.
 - .7 Submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in Article 3.4 Field Quality Control.
 - .5 Mock ups:
 - .1 Concrete finisher to demonstrate experience in light exposed aggregate concrete slab finishing work and bush hammering of exposed foundation at West Addition through mock-ups.
-

- .2 Propose locations and construct one (1) mock-up of the following :
 - .1 Exposed aggregate concrete slab.
 - .2 Bush hammered concrete finish at West Addition.
- .3 Obtain approval of locations from Departmental Representative.
- .4 Provide minimum seven (7) working days' notice to Departmental Representative prior to beginning mock-up.
- .5 Create photographic record of each step of mock-up procedure.
- .6 Undertake each initial step, from labelling, disassembly and surface preparation through repair under direct review of Departmental Representative.
 - .1 Adjust techniques as directed by Departmental Representative until desired results are achieved.
 - .2 Techniques approved by Departmental Representative serve as standard for this work.
- .7 Allow five days for inspection of mock up by Departmental Representative before proceeding with work.
- .8 Obtain Departmental Representative's approval of mock-up before proceeding with the Work.
- .9 When accepted, mock-up demonstrates minimum standard for the work.
- .10 Mock-up may remain as part of finished work.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: deliver to site of Work and discharged within 90 minutes maximum after batching.
 - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Departmental Representative.
 - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

PART 2 PRODUCTS

2.1 DESIGN CRITERIA

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

2.2 PERFORMANCE CRITERIA

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

2.3 MATERIALS

- .1 Portland Cement: to CSA A3001, **Gub 10SF cement.**
 - .2 Water: to CSA A23.1.
 - .3 Aggregates: to CSA A23.1/A23.2.
 - .4 Admixtures:
 - .1 Air entraining admixture: to ASTM C 260.
 - .2 Chemical admixture: to ASTM C 494 and ASTM C 1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .3 Corrosion-inhibiting admixture: to ASTM C 494.
 - .4 Lithium-based admixture: to ASTM C 494.
 - .5 Shrinkage-reducing admixture (SRA): to ASTM C494 and ASTM WK 23938.
 - .5 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 35 MPa at 28 days.
 - .2 Net shrinkage at 28 days: maximum 0%.
 - .6 Non-premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.
 - .7 Curing compound: to CSA A23.1/A23.2 and ASTM C 309, Type 1-chlorinated rubber.
 - .8 Pre-moulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D 1751.
 - .2 Sponge rubber: to ASTM D 1752, Type I, firm grade.
 - .9 Polyethylene film, Bondbreak: 0.25 mm thickness to CAN/CGSB-51.34.
 - .10 Dowels: material type and diameter as per drawings
 - .1 Stainless Steel threaded bars – Grade 316 to ASTM A276
 - .2 Glass Fiber Reinforced Polymer (GFRP) threaded rods to CSA S-807, Grade II, bar size
 - .11 Non-ferrous chairs, bolsters, bar supports, spacers: in accordance with CSA A23.1/A23.2.
 - .11 Tie wire: plastic coated.
 - .12 Bar clips: plastic.
 - .13 Formwork ties: non-metallic.
-

- .14 Moisture Barrier: self-adhesive SBS rubberized asphalt compound.
- .15 Epoxy Adhesive: high strength two-part epoxy adhesive suitable for wet application.
 - .1 Acceptable Materials:
 - .1 Hilti RE-500.
 - .2 Alternative materials: Approved by addendum in accordance with General Instructions to Bidders.
- .16 Cement Slurry bonding agent. 1 part Cement to 1 part water mix.

2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
 - .2 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: A-2.
 - .2 Compressive strength at 28 days age: 35 Mpa minimum.
 - .3 Intended application: Foundation grade beams and slabs.
 - .4 Aggregate size 20 mm maximum.
 - .5 Volume stability: acceptable volume change range 0.04% due to shrinkage, creep and freeze thaw cycle.
 - .6 Other special requirements: exposed aggregate finish for all concrete exposed to view.
 - .3 Provide quality management plan to ensure verification of concrete quality to specified performance.
 - .4 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

PART 3 EXECUTION

3.1 PREPARATION

- .1 Obtain Departmental Representative's written approval before placing concrete.
 - .1 Provide 5 days notice prior to placing of concrete.
 - .2 Verify levels to be achieved, top of grade beams, curb beams and slabs.
 - .3 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
 - .4 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
-

- .5 Pumping of concrete is permitted only after approval of equipment and mix.
- .6 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .7 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing, finishing and curing.
- .8 Protect previous Work from staining.
- .9 Clean and remove stains prior to application for concrete finishes.
- .10 Maintain accurate records of concrete placement items to indicate date, location of casting, quality, air temperature and test samples taken.
- .11 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
 - .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through beams, except where indicated or approved by Departmental Representative.
 - .2 Where approved by Departmental Representative, set sleeves, ties, and other inserts and openings as indicated or specified elsewhere.
 - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
 - .5 Confirm locations and sizes of sleeves and vent openings shown on drawings.
 - .3 Anchor bolts:
 - .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.
 - .1 Formed holes: 100 mm minimum diameter.
 - .2 Drilled holes: 25 mm minimum diameter larger than bolts used or to manufacturers' recommendations.
 - .3 Epoxy: diameter larger than dowel diameter per manufacturer's instructions.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with epoxy grout.
 - .4 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
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3.3 FINISHING AND CURING

- .1 Finish concrete to CSA A23.1/A23.2.
 - .1 Schedule: All exposed concrete to have light exposed aggregate non-slip finish – bush hammered appearance similar to Blacksmith Shop building adjacent.
- .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
- .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
- .2 For light exposed aggregate finish by washing method:
 - .1 Wash exposed concrete at appropriate time with the initial set.
 - .2 Ensure initial set is sufficient to allow concrete finisher on knee boards without making indentation in the concrete
 - .3 Continue until the aggregate has a uniform look and all unwanted paste is removed. If any aggregates become loose and pop out stop and wait for concrete to become more firm
 - .4 Use of low pressure washers or power washers is not permitted
 - .5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.
 - .6 Provide Control Joints and Expansion Joints as indicated on Construction Drawings.

3.4 FIELD QUALITY CONTROL

- .1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .1 Concrete placements.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at 7 and 28 days.
 - .5 Air and concrete temperature.
 - .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory engaged, paid for and coordinated by Contractor to CSA A23.1/A23.2.
 - .1 Ensure testing laboratory is certified to CSA A283.
 - .3 Ensure test results are distributed for discussion at pre-casting concrete meeting between testing laboratory and Departmental Representative.
 - .4 Contractor will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
 - .5 Testing laboratory will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
 - .6 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
-

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Divert unused concrete materials from landfill to local facility.
 - .2 Provide appropriate area on job site where concrete trucks can be safely washed.
 - .3 Divert unused admixtures and additive materials from landfill to official hazardous material collections site.
 - .4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
 - .5 Prevent admixtures and additive materials from entering drinking water supplies or streams.
 - .6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.
 - .7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Definitions:
 - .1 Raking: removal of loose/deteriorated mortar to a depth suitable for repointing until sound mortar, and/or 4x joint thickness and/or a specified mm depth mm is reached.
 - .2 Repointing: filling and finishing of masonry joints from which mortar is missing has been raked out or has been omitted.
 - .3 Tooling: finishing of masonry joints using tool to provide final contour.
 - .4 Low-pressure water cleaning: water soaking of masonry using less than 350 kPa water pressure, measured at nozzle tip of hose.
- .2 Reference Standards:
 - .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.
 - .2 ASTM C207 06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.
 - .3 ASTM C10/C10M -14, Standard Specification for Natural Cement.
 - .2 CSA International
 - .1 CAN/CSA A23.1/A23.2 14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA A82-14, Fired masonry brick made from clay or shale.
 - .3 CAN/CSA A179-14, Mortar and Grout for Unit Masonry.
 - .4 CAN/CSA A3000 13, Cementitious Materials Compendium (Consists of A3001,A3002, A3003, A3004 and A3005).

1.2 ACTION AND INFORMATION SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Unit Rates: Refer to the Unit Rate Table in the Invitation to Bid Documents for items pertaining to this Specification Section. Submit Unit Prices according to units and quantities shown.
 - .3 Product Data:
 - .1 Submit manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
 - .4 Samples:
 - .1 Submit labelled samples of materials used on project for approval before work commences.
 - .1 New foundation stone units.
 - .2 Mortar.
 - .5 Test Reports:
-

- .1 Submit certified test reports showing compliance of mortar with specified performance characteristics and physical properties.

1.3 QUALITY ASSURANCE

- .1 Masonry Contractor:
 - .1 Use single Masonry Contractor for masonry work, including cataloguing and salvaging stone units and laying stone units.
 - .2 Masons:
 - .3 Testing of Mortars:
 - .1 Testing of mortars shall be carried out by a Testing Laboratory designated by the Departmental Representative and paid for by the Contractor.
 - .4 Mock ups:
 - .1 Propose locations and construct one (1) mock-up of the following :
 - .1 Foundation stone cutting to suit new foundation height and levels.
 - .2 Stone pinning.
 - .3 Stone anchoring.
 - .4 Mortar Mixing.
 - .5 Mortar bed application and leveling on concrete foundation.
 - .6 Stone laying.
 - .2 A mock-up schedule is to be submitted to DR for review and approval.
 - .1 Multiple mock-ups can be scheduled within a day or review session.
 - .2 Mock-ups that require mortar should be scheduled on the same day as the mortar mixing mock-up to not waste product or impact project schedule.
 - .3 Obtain approval of locations from Departmental Representative.
 - .4 Provide minimum ten (10) working days' notice to Departmental Representative prior to beginning mock-up.
 - .5 Create photographic record of each step of mock-up procedure.
 - .6 Undertake each initial step, from labelling, disassembly and surface preparation through repair under review of Departmental Representative.
 - .1 Adjust techniques as directed by Departmental Representative until desired results are achieved.
 - .2 Techniques approved by Departmental Representative serve as standard for this work.
 - .7 Allow ten (10) working days for inspection of mock up by Departmental Representative before proceeding with work.
 - .8 Obtain Departmental Representative's approval of mock-up before proceeding with the Work.
 - .9 When accepted, mock-up demonstrates minimum standard for the work.
 - .10 Mock-up may remain as part of finished work.
-

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 45 00 – Quality Control and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements.
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
 - .2 Store cementitious materials and aggregates in accordance with CAN/CSA A23.1.
 - .3 Keep material dry. Protect from weather, freezing and contamination.
 - .4 Ensure that manufacturer's labels and seals are intact upon delivery.
 - .5 Remove rejected or contaminated material from site.
- .3 Packaging Waste Management.
 - .1 Remove for reuse and recycling the pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 – Construction Demolition Waste Management and Disposal.

1.5 AMBIENT CONDITIONS

- .1 Maintain masonry unit temperature between 10 °C and 25 °C for duration of masonry work.
- .2 When ambient temperature is below 10 °C:
 - .1 Allow mortar materials to reach minimum temperature of 10 °C before use.
 - .2 Ensure only sand, aggregate and water are heated before use:
 - .1 Heat and maintain sand and aggregate temperature to minimum 10 °C and maximum 30 °C.
 - .3 Provide hot water to a maximum 30 °C on site during cold weather.
- .3 Maintain sand and aggregate temperature between 10 °C and 30 °C.
- .4 Do not mix cement with water or with aggregate or with water aggregate mixtures having higher temperature than 30 °C.
- .5 Maintain mortar mix temperature between 10 °C and 30 °C.

1.6 EXISTING CONDITIONS

- .1 Designated Substances Report.
 - .1 Refer to Designated Substances/Hazardous Materials Survey – Typical for structures at Bar U Ranch NHS.

PART 2 PRODUCTS

2.1 PERFORMANCE CRITERIA

- .1 Mortar compression strength minimum 2.5 MPa, cured for 7 days.
-

- .2 Mortar compression strength minimum 6 MPa, cured for 28 days.
- .3 Mortar: Type N, 1part cement:1part SA lime:6 parts sand
- .1 Air entrainment test: 9 to 12%.

2.2 MATERIALS

- .1 Mortar mix in accordance with CSA A179.
- .2 Aggregate: to CSA A179.
- .3 Water: potable or from approved non-potable supply.
- .4 Sand: to ASTM C144.
- .1 Sharp, screened and washed pit sand, free of organic material, and colour as supplied from source to match original aggregate and grading to approval of Departmental Representative.
- .5 Grading of sand: sieve analysis for mortar joints between 6 and 10 mm in width:

IMPERIAL	SIEVE SIZE WEIGHT	PERCENTAGE BY WEIGHT PASSING EACH SEIVE	PERCENTAGE BY WEIGHT RETAINED ON EACH SIEVE
No. 4	4.75 mm	100	0
No. 8	2.36 mm	100	0
No. 16	1.18 mm	90	10
No. 30	600 microns	70	20
No. 50	300 microns	40	30
No. 100	150 microns	15	25
No. 200	75 microns	0	15

- .6 Lime: Hydrated, dolomitic finishing lime to ASTM C207, type SA.
- .7 Cement: to CSA A3000, non-staining.
- .8 Grey cement, type 10 Portland.
- .9 Stone Masonry Mortar: Type N, 1 part cement:1part SA lime:6 parts sand
- .1 Type N mortar to be used for both above and below grade instances.
- .10 Stone Units:
 - .1 Stone Units salvaged from existing foundation and from under main barn and west addition wood flooring retrieved upon lifting of barn.
 - .2 Replacement stone units as approved by DR.
- .11 Dowels: material type and diameter as per drawings
 - .1 Stainless Steel threaded bars – Grade 316 to ASTMA276
 - .2 Glass Fiber Reinforced Polymer (GFRP) threaded rods to CSA S-807, Grade II

- .3 Helical Ties: Austenitic stainless steel Grade 304 or 316. 8mm diameter, length to suit application.
- .12 Epoxy Resin Gel
- .1 Epoxy resin, low viscosity, UV stable, capable of setting and curing in wet conditions
- .1 Acceptable Material: Hilti RE 500 or approved equivalent.

PART 3 EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS

- .1 Report in writing to Departmental Representative areas of deteriorated masonry not previously identified.
- .2 Stop work in that area and report to Departmental Representative immediately evidence of hazardous materials.

3.2 PROTECTION OF IN-PLACE CONDITIONS

- .1 Provide protection measures to existing structures suitable for the scope of work.

3.3 PREPARATION

- .1 Carefully salvage, inspect and clean mortar off existing stone from foundation and below wood flooring.
 - .2 Examine condition of existing stone units for signs of deterioration or fracture.
 - .3 Catalogue existing stone unit placement as per Section 02 42 13.01 Selective Deconstruction – Removals
 - .4 Show the layout of catalogued/numbered stones prior to be stored on a record drawing and submit a copy to the Departmental Representative.
 - .5 Confirm size and location of metal vent openings.
 - .6 Review foundation grade beam elevation, main barn and west addition base of structure elevations and site grades and confirm top of stone elevation and variation thereof with DR prior to commencing masonry work.
 - .7 Confirm location of dowels for masonry and log connections.
 - .8 Leave work in safe condition when work is not in progress.
 - .9 Take utmost care not to damage historic fabric. Make good any damage using conservation treatments acceptable to DR.
 - .10 Seal and protect openings, doors, windows, and adjacent areas as required to prevent damage and spread of construction dust, water or other materials into the building.
-

3.4 PROTECTION

- .1 Take necessary precautions to ensure that existing masonry is not damaged during work.
- .2 Provide safe containment, collection and removal of dust and mortar joint dust and related debris.
- .3 Ensure workers are informed of hazards and trained in procedures prior to commencing work. Ensure workers wear protective clothing and gear during work on sandstone.
- .4 Where cutting out produces sandstone dust particles, and cutting out of mortar produces silica dust take the following measures.
 - .1 Use wet techniques to eliminate dust, when possible.
 - .2 Work in sealed enclosure and maintain a negative vacuum system complete with NIOSH approved vacuum and filters.
 - .3 Prevent transmission of airborne dust particles beyond sealed enclosure.
 - .4 Remove residual dust particles daily from sealed enclosure. Maintain work areas in dust-free condition.
 - .5 Prior to commencing work, provide temporary materials and take necessary measures, to prevent ingress of dust into buildings. Immediately remove dust entering buildings and make corrective measures to Departmental Representative's approval, before continuing work.

3.5 BULKING OF SAND

- .1 Bulking tests: If sand is not 100% dry, perform expansion analysis of proposed sand in condition as delivered to site and after any change in environmental conditions. Submit after each delivery or upon request by Departmental Representative
- .2 Test sand for bulking:
 - .1 At start of work;
 - .2 After each new delivery of sand;
 - .3 After an excessive change in weather.

3.6 MIXING MORTAR

- .1 Cement-Lime mortar.
 - .1 Prepare measuring boxes.
 - .1 Ensure accurate proportioning of lime, cement and sand.
 - .2 Pass ingredients through a sieve.
 - .1 Ensure no lime and cement balls are in mix.
 - .3 Mix lime, cement and aggregate thoroughly in standard mixer
 - .1 Ensure lime and sand are completely blended with no spots or streaks of lime.
 - .4 Slowly add one (1) litre water and mix.
 - .1 Use a measuring cup to add more water in small volume to reach desired consistency. Record the final volume of water added.
-

- .5 Mortar must be placed within a period of 90 minutes after the end of mixing, after which it must be discarded.
- .6 Do not re-temper mortars. It is strictly forbidden to add water to the mortar after original mixing.

3.7 STONE MASONRY

- .1 Refer to Section 02 42 13.01, Selective Deconstruction – Removals. Stone units to be removed and re-used to be catalogued and cleaned for reuse.
- .2 Take care not to damage any existing materials such as the logs and/or stone units.
- .3 Verify locations and dimensions of areas of Work with Departmental Representative.
- .1 Store stone units off the ground on pallets in dry area covered with tarp.

3.8 INSTALLATION

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
 - .2 Refer to Drawings for variation of top of stone elevation along east and west sides of barn required to suit target elevations for Barn placement on stone foundation.
 - .3 Review elevations and validate prior to commencement of masonry work.
 - .4 Set line for top of stone elevation for and validate other trades.
 - .5 Build masonry plumb, and true to line and level validated with other trades, and reviewed with the DR.
 - .6 Lay out coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.
 - .7 Review layout and coursing and variable top of stone elevations with DR. Check plumb, location and alignment frequently, as work progresses.
 - .8 Wetting of masonry:
 - .1 Except in cold weather, pre-wet stone having an initial rate of absorption exceeding 1 g/minute/1000 mm²: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
 - .9 Maintain original joint dimensions/widths.
 - .10 Ensure that all new stones are premeasured to fit the exact dimensions in which they will be set.
 - .11 Make certain stone is 100% bedded on all joint sides.
 - .12 Top stone or course of stones must be thoroughly packed, rammed with mortar to ensure no voids and temporarily shimmed to maintain correct position and alignment.
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- .13 Set stones in their natural bedding orientation and in their original orientation (i.e. top up, on full mortar beds. Finish to struck mortar joint.
- .14 Remove stainless steel tags used for cataloging prior to installation.

3.9 SITE TOLERANCES

- .1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.10 STONE CUTTING

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .2 Wetting of masonry:
 - .1 Except in cold weather, pre-wet stone having an initial rate of absorption exceeding 1 g/minute/1000 mm²: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
- .3 Lay out coursing and bond to achieve correct coursing heights, with minimum of cutting.
- .4 Review layout and coursing and variable top of stone elevations with DR. Check plumb, location and alignment frequently, as work progresses.
- .5 Mark areas where cutting is required to suit designated top of stone elevations with chalk. Review with DR.
- .6 Wet masonry units prior to cutting to limit dust. Cut masonry units to suit new top of stone elevations. Review with DR.

3.11 STONE PINNING REPAIR

- .1 Divided portions of broken stone will be reattached along broken surfaces.
 - .2 Drill holes of suitable diameter (18 mm) on one broken surface, marking angle of drill direction on outside of stone with chalk.
 - .3 Raise this portion of stone and lower onto exact position of second broken half of stone. Once together, tap stone to loosen dust from drilled hole. Extend chalked lines marking angle of drill on second, undrilled portion of stone.
 - .4 Lift up originally drilled half. Location of corresponding holes to be drilled in second portion will be marked by small piles of drilling dust.
 - .1 Mark these locations and drill holes depth indicated on the drawings (75 mm).
 - .5 Thoroughly clean holes using vacuum cleaner and small attachments that fit to bottom of hole. Following this, wipe hole with cotton swabs that have been wetted with acetone.
 - .6 Fill holes with epoxy resin just enough to allow for GFRP dowel rod to be inserted without spillage onto broken surfaces. Alternatively, apply thin coating of epoxy to GFRP dowel prior to inserting.
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- .7 Apply a thin coating of 1:1 cement-lime slurry brushed onto the broken surfaces just prior to bringing the two portions firmly together. Pre-wet the interface surfaces before applying the slurry.
- .8 Restrain position using clamps placed to provide compressive pressure between portions.

3.12 FOUNDATION STONE DOWEL

- .1 Helical Ties, installed by dryfix method, for ties between concrete grade beams and stone masonry. Spacing as indicated on drawings. Coordinate stone masonry to grade beam tie spacing with Log to Stone masonry dowel spacing.
- .1 Stainless steel dowels to be installed to connect the base timber log to the stone masonry installed on grade beams. Timber base log to be generally centred over the width of the stone masonry assembly. Placement of base timber log over stone foundation to be reviewed with DR.
- .2 Clean out dust from drill holes for dowels.
- .3 Set stainless steel threaded rod dowels into epoxy and let cure following manufacturer specifications.
- .4 Helical ties to be installed vertically in mortar joints and bent where possible into horizontal mortar joint of stone units.

3.13 TIMBER LOG to STONE MASONRY DOWEL

- .1 Determine the position of the base timber log on top of the low stone masonry wall. Placement of base log to be approved by Departmental Representative.
- .2 Mark locations along the length of timber to install stainless steel threaded rod dowel. Dowels to be spaced as per drawings.
- .3 Place leveling mortar bed on top stone course. Review with Departmental Representative. Cure mortar according to 3.14 – PROTECTION DURING CURING PROCESS.
- .4 Drill holes in masonry units as required for dowel installation. Install stainless steel threaded rod dowels into epoxy following manufacturer specifications.
- .5 Dowel connection up to new bottom logs on foundation to be friction fit. Review with Departmental Representative.

3.14 PROTECTION DURING CURING PROCESS

- .1 Damp cure:
 - .1 Provide damp cure for stone masonry for minimum 5 days.
 - .2 Install and maintain wetted burlap protection at the end of each day and during the curing process.
 - .2 Protect masonry and other work from marking and impact damage. Protect completed work from mortar droppings. Use non-staining coverings.
 - .3 Maintain protection for minimum three weeks.
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3.15 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Clean surfaces of mortar droppings, stains and other blemishes resulting from work of this contract as work progresses.
- .3 Remove droppings and splashings using clean sponge and water.
- .4 Clean masonry with stiff natural bristle brushes and plain water only if mortar has fully cured.
- .5 Clean masonry with clean water and soft natural bristle brush.
- .6 Obtain approval of Departmental Representative prior to using other cleaning methods for persistent stains.
- .7 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers
- .8 Construction Waste Management.
 - .1 Separate construction waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

3.16 PROTECTION OF COMPLETED WORK

- .1 Protect adjacent finished work against damage which may be caused by on-going work.
- .2 Protect completed work against damage while curing and at all times prior to wood structures being lowered onto new foundations. Make good any damage.
- .3 Inspect masonry work for any damages once wood structures are placed on new foundations. Make good any damage.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 53/A 53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A 269M-[15a], Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .4 ASTM F 593-[13ae1], Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
- .2 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA S16-09, Design of Steel Structures.
 - .3 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .4 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

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 sections, plates, pipe tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit for shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Hot rolled steel sections and plates: to CSA G40.20/G40.21, Grade 300W.
 - .1 Black Steel for vertical steel bar where indicated at twisted logs.
- .2 Lag Screws. Bolts and anchor bolts: to ASTM A307
Stainless steel tubing: to ASTM A 269, Type 304, seamless welded
- .3 Stainless Steel threaded rod, bolts, fasteners – Grade 304 to ASTM A276

2.2 SPECIALTIES: VISITOR BARRIERS

- .1 Posts:
 - .1 Material: Steel:
 - .1 Steel I-beam
 - .2 Steel eyelets, Refer to Details
 - .2 Size:
 - .1 I-beam: S3 x 5.7, Length: Refer to Details.
 - .2 Eyelets, Refer to Details.
 - .3 Finish:
 - .1 Shop Paint.
 - .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items. Apply two coats of primer to areas inaccessible after final installation.
 - .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, and grease. Do not paint when temperature is lower than 7°C.
 - .3 Clean surfaces to be field welded. Do not paint.
 - .4 Non-ferrous metals shall be finished as specified by item.
 - .5 Refer to Section 09 97 19 for painting of exterior metal surfaces.
- .2 Rope Snap Ends:

- .1 Material: Metal
- .2 Size: for 25mm rope
- .3 Finish: Smooth black
- .4 Style: Snap End
- .3 Accessories: Rope
- .1 Material: Natural Rope, to be approved by Departmental Representative
- .2 Size: 25mm Ø
- .3 Finish: N/A

2.3 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use flat headed machine screws on items requiring assembly by screws or as indicated.
- .3 Fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.

- .6 Field welding not permitted.
- .7 Coordinate openings with approved shop drawings of electrical components housed in the service masts. Provide connection and mounting points for electrical boxes as required.

3.3 CLEANING

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

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA B111-[1974(R2003)], Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-O80 Series-[15], Wood Preservation.
 - .3 CSA O86 Consolidation-[14], Engineering Design in Wood.
 - .4 CAN/CSA-Z809-[08], Sustainable Forest Management.
- .2 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.
- .3 Green Seal Environmental Standards (GS)

1.2 PERFORMANCE REQUIREMENTS

- .1 General Contractor to have relevant experience in Conservation Treatment of Period Log Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Unit Rates: Refer to the Unit Rate Table in the Invitation to Bid Documents for items pertaining to this Specification Section. Submit Unit Prices according to units and quantities shown.
- .3 Shop Drawings:
 - .1 Submit drawings for shoring systems stamped and signed by professional engineer registered or licensed in the Province of Alberta, Canada – Refer to Specification Section 02 43 13.
 - .2 Submit shop drawings to scale of logs showing details, measurements, taper, layout of repairs and replacements, and sequence of repair and replacement work.
 - .3 Indicate required coordination with other trades and sub-trades.
- .4 Source Quality Control Submittals
 - .1 Submit invoices, purchase orders, and suppliers' certificates when requested by Departmental Representative.
 - .2 Submit log suppliers' certificates indicating when logs were cut, when bark was removed and how they were seasoned. Logs must be certified to have been cut between December 15 and March 1, and cleaned of bark after cutting. Bark must have been cleaned prior to April 1. Logs with evidence of significant checking, insect infestations, and effects of improper seasoning, spiral checks, early or premature decay will be rejected.
 - .3 Advise Departmental Representative before ordering or purchasing materials.
 - .4 Departmental Representative to examine and review materials prior to purchase by contractor.

- .5 Provide free access to materials for examination by Departmental Representative before beginning work on site.
- .6 Hand tools are to be used for repair work and cutting of existing logs unless otherwise approved by the DR. Such approval will be contingent upon in-person demonstration of skills.

1.4 QUALITY ASSURANCE

- .1 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.
- .2 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Initial Mock-Ups: Construct mock-ups on site of the following repairs with new full log material, prior to carrying out Mock-up work on the existing logs of the structure.
 - .1 Splice Detail with dovetail
 - .2 Dovetail joint splice detail
 - .3 Log splice detail
 - .4 Log refacing – exterior
 - .5 Dovetail end fabrication
 - .6 Date stamping by branding
 - .3 Mock-Ups on Structure: Upon acceptance of Initial Mock-ups, Construct a full-size mock-ups of the following repairs including using new log material, prior to carrying out work on the existing logs.
 - .1 Log Replacement
 - .2 Splice Detail with dovetail
 - .3 Dovetail joint splice detail
 - .4 Log splice detail
 - .5 Log refacing – exterior
 - .6 Daubing Mixing
 - .7 Dovetail end fabrication
 - .8 Date stamping by branding
- .4 Provide minimum ten (10) working days' notice to Departmental Representative prior to beginning mock-up.
- .5 Allow ten (10) working days' notice for inspection of mock-up by Departmental Representative before proceeding with Work.
- .6 Multiple mock-ups can be scheduled within a day or review session as to not impact overall project schedule.
- .7 When accepted, mock-up demonstrates minimum standard for this Work.
- .8 Mock-up may remain as part of finished Work if designated by Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Deliver wood required for repairs to site minimum 1 month before start of work.
- .3 Storage and Handling Requirements:
 - .4 Wood delivered to site:
 - .1 Store materials in dry, well-ventilated area.
 - .2 Stack all wood above ground with spacers between layers. Ensure adequate ventilation for air-drying. Use methods to keep logs off ground, to keep air circulation between logs and over top of logs.
 - .3 Support materials above soil with spacers between layers. Protect from rain, direct sunlight and snow.
 - .4 Protect from Moisture and Sun exposure. Do not place tarps in direct contact with logs. Place block and plywood cover on top that permits air circulation.
 - .5 Protect wood from nicks, scratches, blemishes and exposure to elements.
 - .6 Replace defective or damaged materials with new.
 - .7 Logs:
 - .1 Handle with log tongs or ropes. Do not use chains.
 - .2 Avoid dragging and marring of surface.
 - .8 Protect adjacent timber elements and materials from damage during handling.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- .1 Logs:
 - .1 Replacement Horizontal logs:
 - .1 Species: Spruce to match existing logs.
 - .2 Size: logs to match logs to be replaced in profile, taper as measured on site. Allow for extra length to be cut to suit on site at time of installation. Log diameter to take into account expected shrinkage based on moisture content recorded prior to delivery to site.
 - .3 Moisture Content: Moisture Content of logs selected for repair and replacement to be determined through measurements prior to selection of log diameter from site measurements.
 - .4 Grade: S-P-F Select Structural.
 - .5 CAN/CSA-Z809 or FSC or SFI certified.
 - .6 Preparation: Bark to be carefully removed to prevent damage. Logs to be cut to length after delivery to site and to be delivered with bark already carefully removed leaving smooth wood surface. Naturally occurring small bumps and anomalies are allowed.

- .7 Log grain to be straight (no twisting) and log is straight, not carved turned or cut to be straight.
- .8 Refer to Article 1.4 Quality Assurance for additional requirements.
- .9 Alterations to these specifications may be considered upon DR's review and approval.
- .2 New Joist Logs:
 - .1 Species: Spruce to match existing logs.
 - .2 Grade: S-P-F Select Structural.
 - .3 Preparation: logs to be cut to suit span of outer edge of beam to outer edge of beam, and mechanically hewn 2 sides at top and bottom with top and bottom portions to not be less than 150 mm +/- 5 mm. Logs to be delivered with bark removed.
 - .4 Bark to be carefully removed by hand to prevent damage.
 - .5 Log grain to be straight (no twisting) and log is straight, not carved turned or cut to be straight.
 - .6 Review logs delivered to site with DR. Refer to Article 1.3 Quality Assurance for additional requirements.
- .3 Horizontal Log Repairs:
 - .1 Species: Spruce to match existing logs.
 - .2 Size: log sections to match existing logs to be repaired in profile, taper as measured on site. Logs may need to be trimmed/profiled to the surfaces of the existing log. Log diameter to take into account expected shrinkage based on moisture content recorded prior to delivery to site, as well as slight.
 - .3 Moisture Content: Moisture Content of logs selected for repair and replacement to be determined through measurements prior to selection of log diameter from site measurements. Moisture content for horizontal log repairs to be similar to moisture content of existing logs to minimize shrinkage between new repair piece and existing logs.
 - .4 Grade: S-P-F Select Structural.
 - .5 Preparation: Bark to be carefully removed to prevent damage. Logs to be cut to length after delivery to site and to be delivered with bark already carefully removed leaving smooth wood surface. Naturally occurring small bumps and anomalies are allowed.
 - .6 Log grain to be straight (no twisting) and log is straight, not carved turned or cut to be straight.
 - .7 Refer to Article 1.3 Quality Assurance for additional requirements.
- .2 Hardwood pegs:
 - .1 Size and shape: to match existing, hand cut.
 - .2 CAN/CSA-Z809 or FSC or SFI certified.
- .3 Hardwood wedges:
 - .1 Species: Spruce to match existing material.
 - .2 CAN/CSA-Z809 or FSC or SFI certified.
- .4 Dampproofing:
 - .1 Lead Sheet: not less than 1.7 mm.

- .2 Ruberized Moisture Barrier: Self-adhering composite membrane consisting of an SBS rubberized asphalt compound, integrally laminated high-density polyethylene film. Blueskin or approved equivalent.
- .5 Structural Screws:
 - .1 High Strength Recessed Star Drive. Minimum Strengths - Bending 170,000 psi yield, Tensile 188,000 psi, Shear 127,000 psi. Sizes as follows for Types 1-8 indicated on Dwgs. Acceptable Material GRK RSS Structural Screw, or approved equivalent.
 - .1 Type 1 - 5/16" x 5-1/8"
 - .2 Type 2 - 3/8" x 12"
 - .3 Type 3 - 3/8" x 10"
 - .4 Type 4 - 3/8" x 8"
 - .2 Stainless steel lag bolts:
 - .1 Black
 - .2 19 mm x 175 mm
- .6 Steel Strapping:
 - .1 12 mm x 75 mm black steel bar, date stamped.
- .7 Daubing lath: stainless steel barbed wire and nails
- .8 Wood Plugs:
 - .1 Wood plugs to be from same member they are installed in.
 - .2 Grain of plug must match repair section or existing log.
- .9 Wood Preservative:
 - .1 Boracol Inorganic Boron Wood preservative.
Acceptable product: Sansin **Boracol** 20-2.

2.2 CHINKING AND DAUBING MIX:

- .1 1 Part Portland cement
- .2 1 Part hydrated lime Type SA
- .3 1.3 parts sand
- .4 10 parts dried straw or grass
- .5 20 parts Plainsman Fire Clay, from pottery supplier.

PART 3 EXECUTION

3.1 PROTECTION OF IN-PLACE CONDITIONS

- .1 Supply and Install plywood protection at interior of structure.
- .2 Install plywood protection around exterior of structure as required.
- .3 Provide other protection measures to existing structures suitable for the scope of work.

- .4 Protect adjacent surfaces from damage prior to undertaking removals, in-situ repairs and refinishing.

3.2 EXAMINATION

- .1 Verify existing conditions as indicated on Contract Documents.
- .2 Investigate timber structure and report to Departmental Representative conditions relevant to this contract not described in drawings. Notify Departmental Representative of conditions not noted on Contract Drawings.
- .3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .4 Examine areas where log repairs or replacement are indicated on Contract Drawings.
 - .1 Visually inspect areas for evidence of decay and hammer tap areas.
 - .2 Confirm areas of decay exhibited on logs, and corresponding repair, replacement types with Departmental Representative.
 - .1 Repair and Replacement Designations, and lengths of horizontal log splices will be confirmed on site by DR through additional on-site testing.
 - .2 Contractor to assist DR with testing for decay by DR including:
 - .1 Resistograph testing by DR. Contractor to provide safe access.
 - .2 Incremental Borer testing by Contractor. Incremental borer to have bits are made from hardened steel with low friction coating, stainless steel extractor with metallic head designed for easy core extraction of the wood core.
 - .3 Mark log repair, replacement designations on drawings and on log surface with suitable marking crayon.
- .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .6 Examine building for level and trueness. Establish a reference plane for repositioning.
- .7 Stop work and report in writing immediately to Departmental Representative evidence of structural deficiencies, fungal activity or insect infestation not described on drawings which will affect scope of the work and durability of the finished product.

3.3 SPECIAL TECHNIQUES

- .1 Trim selected faces of logs to desired finished thickness and appearance.
- .2 Trim logs to desired finished length and size.
- .3 Apply Boracol wood preservative to all surfaces of replacement and existing logs that will not receive paint finish.
- .4 Date Stamping:
 - .1 Date stamp all new logs and logs used in repairs with brand.
 - .2 Brand to be placed in area that will not be visible.

3.4 CONSTRUCTION

- .1 Fit corner joints and intersecting members accurately and to ensure tight fit.
- .2 Obtain governing dimensions from Departmental Representative before fabricating items which are to accommodate or abut work of other Sections.
- .3 Job dimensions, where applicable are to govern size of fabricated units.
- .4 Install leveling mortar bed to top of stone foundations.
- .5 Fasten waterproofing to top of mortar bed and ensure it is not visible past the sill logs.
- .6 Install infill and sill logs in accordance with Contract Drawings, Shop Drawings and reviewed mock-ups.
 - .1 Prepare sill and infill logs with detail for water/moisture management and anti-split detail.
 - .2 Place first full sill log on foundations at right angles to direction of floor joists/beams, matching existing, east and west elevations of main barn.
 - .3 Place first half infill log on foundation parallel to direction of floor joists/beams, and place next full sill log on half log, notching log to first sill log. North and South elevations of main barn.
 - .4 Anchor sill logs to foundation at as indicated on drawings.
- .7 Erection of logs:
 - .1 Fit logs tightly together.
 - .2 With irregular surfaced logs, scribe portions of underside of upper log to secure tight fit.
 - .3 Regulate height of corners of building using the following methods: increasing or decreasing depth of notch, and temporary shimming up with air bag jacks. Take into account wood log shrinkages expected at north elevation wall where most logs are replaced.
 - .4 Keep inside face of logs plumb.
- .8 Pinning log courses:
 - .1 Log courses to be pinned together with hardwood pegs or long spikes to match existing staggered in alternate courses spaced 900 mm centre to centre or as approved by DR based on existing.
 - .2 Log courses to be pinned together 600 mm from each corner and from each side of openings.
 - .3 Hardwood pegs to be roughly 45 mm square for driving in a 45 mm diameter hole.
 - .4 For spikes, bore suitable diameter hole half way through upper log and continue with same diameter hole through bottom half. Drive spike until it penetrates half log.
- .9 Jointing:
 - .1 Corner joint to be dovetail joint. Create dovetail end using hand tools and traditional methods.
 - .2 Log partition intersection at outside wall joint to be as indicated. Refer to Contract Drawings.
 - .3 Fit joints tightly together.

- .10 Protect Work at end of workday.
- .1 Cover with waterproof covering.
 - .1 Anchor covering securely in place.

3.5 CHINKING AND DAUBING:

- .1 Mixing:
 - .1 Cut local grass/straw to 50 mm in length.
 - .2 Soak clay and cut grass/straw overnight.
 - .1 Drain off excess water.
 - .3 Add sand, cement, lime and clay and mix until combined. Add water if required.
 - .1 Guidelines for quantity of water added for daubing consistency will be determined during mock-up.
 - .4 Mix until combined.
- .2 Raking Joints:
 - .1 Remove all existing chinking from joints.
 - .2 Rake out all existing daubing from log joints.
 - .3 All raking out of daubing must be performed with hand tools.
- .3 Application:
 - .1 Cut wooden wedges, tapered on opposite sides and drive up one against other to seat them securely between logs and to exterior spaces apply chinking.
 - .2 Pack space between logs from both sides with wood wedges to match existing and to exterior spaces apply lime daubing.
 - .3 Install stainless steel barbed wire into top log of the joint, with stainless steel nails as required.
 - .4 Thirty minutes prior to daubing application, dampen logs thoroughly to control absorption into the logs and prevent premature drying of the daubing.
 - .5 Pack daubing firmly into the exterior log joint carefully compressing the daubing with a trowel to remove any air pockets.
 - .6 Trowel daubing surface smooth.
 - .7 Provide Damp Cure with wet burlap for 7 days.

3.6 LOG REPLACEMENT:

- .1 Perform log replacement where indicated on Contract Documents and verified and marked on site with the DR.

3.7 SPLICE DETAIL WITH DOVETAIL:

- .1 Cut out damaged wood sections 50 mm past decay where indicated on Contract Drawings and marked on site with the DR. Exact locations to be determined on site with DR during on site examination of timber structure.
- .2 Splice in new wood sections to match profile of existing wood section.

- .1 All fastener holes to be pre-drilled and countersunk by +/- 20mm, except where indicated otherwise.
- .3 Shop fit parts before fastening with structural screws.
- .4 Install wood plug at pre-drilled fastener locations.
- .1 Same wood species as existing parent wood component, repair or
- .2 Grain orientation to match existing parent wood component.

3.8 DOVETAIL END SPLICE DETAIL:

- .1 Cut out damaged wood sections 50 mm past decay where indicated on Contract Drawings and marked on site with the DR. Exact locations to be determined on site with DR during on site examination of timber structure.
- .2 Splice in new wood sections to match profile of existing wood section.
- .1 All fastener holes to be pre-drilled and countersunk by +/- 20mm.
- .3 Shop fit parts before fastening with structural screws. Splice joints must be tight. If not tight, remove and cut new splice at no extra cost.
- .4 Install wood plug at pre-drilled fastener locations.
- .1 Same wood species as existing parent wood component, repair or
- .2 Grain orientation to match existing parent wood component.

3.9 LOG SPLICE DETAILS:

- .1 Cut out damaged wood sections 75 mm past decay where indicated on Contract Drawings and marked on site with the DR. Exact locations to be determined on site with DR during on site examination of timber structure.
- .2 Splice in new wood sections to match profile of existing wood section.
- .1 All fastener holes to be pre-drilled and countersunk by +/- 20mm.
- .3 Shop fit parts before fastening with structural screws. Splice joints must be tight. If not tight, remove and cut new splice at no extra cost.
- .4 Install wood plug at pre-drilled fastener locations.
- .1 Same wood species as existing parent wood component, repair or
- .2 Grain orientation to match existing parent wood components.

3.10 LOG REFACING – EXTERIOR:

- .1 Cut out decayed face to sound depth or to a minimum of 50 mm from exterior face. Departmental Representative to inspect log marked on site with the DR. Exact locations to be determined on site with DR during on site examination of timber structure.
- .2 Splice on new log face to match original profile of log.
- .1 All fastener holes to be pre-drilled and countersunk by +/- 20mm.

- .3 Shop fit parts before fastening with structural screws. Joints must be tight. If not tight, remove and cut new log face at no extra cost.
- .4 Fasten with structural screws indicated for log refacing at spacing indicated on Construction Documents.
- .5 Install wood plug at pre-drilled fastener locations.
- .1 Same wood species as existing parent wood component, repair or
- .2 Grain orientation to match existing parent wood component.

3.11 NEW ADDITIONAL LOG JOISTS

- .1 Prepare new joists, profile to match existing as closely as possible.
- .2 Install new joist in designated areas from below without removing loft flooring.
- .3 All fastener holes to be pre-drilled into flooring, new joist and existing beam. Fastener holes in flooring to be countersunk flush with wood plank surface.
- .4 Fasten joists with structural screws without removing flooring.

3.12 STRUCTURAL SCREW INSTALLATION AT LARGE CHECKS

- .1 Locations will be designated by the DR, and reviewed with the Contractor.
- .2 Confirm structural screw type/length and spacing with DR and install in accordance with Manufacturer Instructions at locations reviewed with DR.
- .3 Install designated structural screw types as discussed with DR.
- .4 Countersink 20 mm and install wood plug.

3.13 VERTICAL STRAPPING AT TWISTED LOGS

- .1 Confirm locations with DR.
- .2 Custom cut wood spacers for each location to suit full bearing between strap and logs.
- .3 Pre-drill fastener holes in logs.
- .4 Fasten steel strap on through of wood spacers and into logs with lag bolts.

3.14 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 CSA Group CSA
 - .1 CSA O86-[14], Engineering Design in Wood.
 - .2 CAN/CSA-Z809-[08], Sustainable Forest Management.
- .2 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-[2004], FSC Principle and Criteria for Forest Stewardship.
- .3 Green Seal Environmental Standards (GS)
 - .1 GS-36-[11], Commercial Adhesives.
- .4 National Lumber Grading Authority (NLGA)
 - .1 NLGA Standard Grading Rules for Canadian Lumber [2007].
- .5 Sustainable Forestry Initiative (SFI)
 - .1 SFI-[2010-2014] Standard.

1.2 PERFORMANCE REQUIREMENTS

- .1 General Contractor to have relevant experience in Conservation Treatment of Period Heavy Timber Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets of wood components and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Source Quality Control Submittals
 - .1 Submit invoices, purchase orders, and suppliers' certificates when requested by Departmental Representative.
 - .2 Advise Departmental Representative before ordering or purchasing materials.
 - .3 Departmental Representative to examine and review materials prior to purchase by contractor.
 - .4 Provide free access to materials for examination by Departmental Representative before beginning work on site.

1.4 QUALITY ASSURANCE

- .1 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

- .2 Qualifications:
- .3 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct a full-size mock-up of timber column splices.
 - .3 Provide 14 days notice of mock-ups and allow ten days for inspection of mock-up by Departmental Representative before proceeding with work.
 - .4 When accepted, mock-up demonstrates minimum standard for this work.
 - .5 Mock-up may remain as part of finished work if accepted.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 1 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Deliver wood required for repairs to site 2 weeks before start of work.
- .3 Storage and Handling Requirements:
 - .1 Storage area designated by Departmental Representative .
 - .2 Store materials off ground in dry location, vented for air circulation and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .3 Replace defective or damaged materials with new.
 - .4 Store and protect wood.
 - .1 Stack wood above ground or soil with spacer slats between layers to ensure adequate ventilation for air drying.
 - .2 Cover wood supply with polyethylene sheet.

1.6 AMBIENT CONDITIONS

- .1 Adhesive repair:
 - .1 Maintain temperature of elements to be repaired at between 21 degrees C and 24 degrees C throughout its thickness and for 48 hours after repairing.
 - .2 Provide temporary enclosure and heating and cooling equipment necessary to maintain temperatures specified.
 - .3 Undertake work under conditions of relative humidity at same level as operational requirements of end product.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Heavy Timber framing for column splices: Sizes as indicated on drawings.
 - .1 CAN/CSA-Z809 or FSC or SFI certified.
 - .2 Grade: S-P-F Select Structural
 - .3 Moisture content: 15%

- .4 Special finishes: Rough sawn
- .2 Dimension lumber:
 - .1 S-P-F Select Structural.
 - .1 CAN/CSA-Z809 or FSC or SFI certified.
 - .2 Size: as indicated on drawings, custom cut as required from larger stock.
 - .3 Moisture content: 15%.
 - .2 Rough sawn lumber for beam reinforcement:
 - .1 Species: Douglas fir
 - .2 Grade: Select Structural .
 - .3 Size: as indicated. 50 mm x 200 mm, width custom cut along length to suit varying width of beams.
 - .4 Grain orientation to match existing parent wood component.
 - .5 CAN/CSA-Z809 or FSC or SFI certified.
- .3 Wood plugs:
 - .1 Cover recessed bolts, screws with wood plugs cut from same wood member as parent material.
 - .2 Direction of grain to match existing.
 - .3 Size to give firm flush fit in bolt hole.
 - .4 Plug is required to be same species as host material.
- .4 Timber connections:
 - .1 Structural screws:
 - .1 High Strength Recessed Star Drive. Minimum Strengths - Bending 170,000 psi yield, Tensile 188,000 psi, Shear 127,000 psi. Sizes as follows for Types 1-8 indicated on Dwgs.
 - .1 Type 1 - 5/16" x 5-1/8"
 - .2 Type 2 – 3/8" x 12"
 - .3 Type 3 – 3/8" x 10"
 - .4 Type 4 – 3/8" x 8"
 - .2 Common wire nails:
 - .1 Type 2 – 100 mm
- .3 Rubberized moisture barrier. Self-adhering composite membrane consisting of an SBS rubberized asphalt compound, integrally laminated high-density polyethylene film. Blueskin or approved equivalent.
- .5 Timber to concrete connections:
 - .1 Concealed post tie connector and base plate and accessories.
Acceptable Product: Simpson Strong Tie CPTZ concealed post connector, stainless steel. Custom sized to suit post size. Baseplate Black.
- .6 Non-shrink grout: high-performance, non-shrink, fluid, cementitious grout with silica fume.
- .7 Expansion Anchors: Heavy duty, Stainless steel, Bolt head.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .2 Stop work and report immediately to Departmental Representative conditions relevant to this contract not described in drawings: evidence of deficiencies, fungal or insect attack which may affect the scope of work and durability of the finished product.

3.2 PREPARATION

- .1 Protection of in-place conditions:
 - .1 Given the Work Horse Barn is designated as a “Classified” Federal Heritage Building and clues to its evolution overtime are identified as contributing to its heritage character, all work on the building must be respectful of the heritage fabric. When undertaking selective demolition as required, proper precautions must be taken to protect surrounding elements. This may include installing protective sheets around elements that are not included in the scope of work while work is undertaken on adjacent elements. In general, selective demolition should reflect a minimal intervention approach only removing elements and parts thereof that have been previously identified in the tender documents.
 - .2 Protect existing finishes, surfaces, timber elements, and materials adjacent to repair area from damage during the Work.
- .2 Surface Preparation:
 - .1 Install adequate scaffolding, ladders and platforms for completion of work in accordance with Contract Drawings.
 - .2 Install adequate shoring and bracing. Ensure support in vicinity of repair.
 - .1 Review with Departmental Representative before start of Work.

3.3 CONSTRUCTION

- .1 Confirm repair, replacement locations with DR, as well as length of splices.
- .2 Cut back decayed wood to a point 50 mm beyond the last evidence of decay.
- .3 Remove decayed wood with extreme care. Cause neither disruption nor damage to adjacent surface and structural integrity of the member.
- .4 Joints:
 - .1 Lay out and cut joints to approved mock-up.
 - .2 Shape repair piece using band saw, to Departmental Representative's approval according to approved sample.
 - .3 Trial fit joints before fastening in place. Adjust as necessary to ensure close accurate fit with adjacent surfaces prior to fastening.

- .4 Plugs:
 - .1 Same wood species as existing parent wood component.
 - .2 Grain orientation to match existing parent wood component.
- .5 Fasteners:
 - .1 Recess structural screw heads 15 mm below exterior wood surface.
 - .2 Trial fit joint and metal framing connections before fastening in place. Adjust as necessary to ensure close accurate fit.

3.4 SQUARE TIMBER POST SPLICE

- .1 Cut out designated material where indicated on Contract Drawings. Ensure lap length of 300 mm between splice material and existing post.
- .2 Splice in new wood sections to match profile and grain orientation of existing wood section and to suit new height.
 - .1 All fastener holes to be pre-drilled.
- .3 Shop fit parts before fastening with structural screws. Splice joints must be tight. If not tight, remove and cut new splice at no extra cost.
 - .1 Countersink fastener heads 20 mm below exterior wood surface where indicated, for corresponding wood plug installation.
- .4 Install wood plug at pre-drilled fastener locations.
 - .1 Same wood species as existing parent wood component, repair or
 - .2 Grain orientation to match existing parent wood component.

3.5 SQUARE POST SISTERING

- .1 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Where screws are used to secure members, countersink screws round smooth cut hole and plug with wood plug to match material being secured.
 - .3 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.6 BUILT-UP 3-PLY WOOD POST SPLICE

- .1 Cut out designated material where indicated on Contract Drawings. Ensure lap length of 300 mm between splice material and existing post.
- .2 Splice in new wood sections to match profile of existing wood section and to suit new height.
- .3 Shop fit parts before fastening with structural screws. Splice joints must be tight. If not tight, remove and cut new splice at no extra cost.
 - .1 Recess fastener heads 20 mm below exterior wood surface.
- .4 Fasten spliced materials to existing post.

- .5 Install wood plug.

3.7 CIRCULAR WOOD POST REPLACEMENT

- .1 Remove existing circular wood post carefully as to not damage surrounding materials. Record existing location to ensure replacement is installed at proper location.
- .2 Install new circular wood column.
 - .1 Cut wood column to suit new height. Retain any cut off material.
 - .2 Secure column to post tie connector. Countersink fasteners by 15 mm.
 - .3 Fabricate wood plugs from column cut off material.
 - .1 Grain direction of plugs to match grain of column.
 - .2 Diameter of plugs to match diameter of countersunk hole and be 15 mm in length.
 - .4 Install wood plugs. Plugs to be secured using friction fit.

3.8 POST SISTERING ADJACENT TO PLANK WALL

- .1 Carefully remove existing plank wall and 60x60 mm wood members.
- .2 Fit in new wood sections to match construction of existing wood built up post and to suit new height.
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
- .3 Shop fit parts before fastening with structural screws. Sistering joints must be tight. If not tight, remove and cut new at no extra cost.
 - .1 Length to suit new height.
- .4 Secure 50 x 89 mm member to existing 150 mm x 150 mm wood post in front with Type 3 structural screws.
- .5 Reinstate existing plank wall.
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Shop fit parts before fastening with structural screws and saw cutting.
 - .3 Saw cut ends of plank to suit new members.
- .6 Position exterior wood members on either side of the 50 x 89 mm member. Secure members together with Type 7 structural screws.
 - .1 Countersink structural screws by 15 mm
 - .1 Install wood plugs. Plugs to be secured using friction fit.
- .7 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Where screws are used to secure members, countersink screws round smooth cut hole and plug with wood plug to match material being secured.

- .3 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.9 LOG BEAM REINFORCEMENT

- .1 Beam reinforcement repair to be coordinated with lifting and moving of log building outlined in Specification Section 02 43 13.01 – Historic Structure – Lifting/Moving. Any adequate bracing and shoring is required to be in place before the work is started. Review sequencing of repair in overall schedule with DR.
- .2 Carefully remove the beam from the pocket in the log wall in two pieces using the lap joint as a break point.
- .3 Lightly clean top of beam.
- .4 Cut reinforcement to fit length of beam and place on top of beam. Trim the sides of the reinforcement member to be flush with the edge of the top of the beam, if required.
- .5 Fasten reinforcement member to top of beam with structural screws at designated spacing on drawings.
- .6 Measure and compare the height of the beam including the new reinforcement to the existing beam pockets. Using hand tools, carefully enlarge the existing beam pockets to suit new beam height.
- .7 Reinstate beam in newly enlarged beam pockets.

3.10 SQUARE TIMBER POST TO CONCRETE ANCHORING:

- .1 Shop fit wood members, Concealed Post Connector and pins before fastening.
- .2 Place base plate in existing square timber post location and mark bolt locations with chalk on concrete. Ensure placement is in-line with beam and is at existing column location before marking.
- .3 Drill holes of suitable diameter for expansion anchors on concrete grade beam at existing square timber post location to match base plate.
- .4 Clean out dust from holes, and install expansion anchors in accordance with manufacturers instructions.
- .5 Lay 10 mm +/- non-shrink grout pad with chamfered edges. Review with DR.
- .6 Install rubberized moisture barrier in area intended for column replacement on grout pad to suit base of post tie connector and plate connector.
- .1 Trim rubberized moisture barrier to suit column dimensions so it is not visible.
- .7 Pre-drill anchor locations in member to suit concealed post tie connector, plate and pins.
- .8 Anchor concealed post tie connector and plate to concrete grade beam.
- .9 Secure wood member with pins.
- .10 Install wood plugs ensuring tight fit.

3.11 BUILT-UP 3-PLY WOOD POST TO CONCRETE ANCHORING:

- .1 Shop fit wood members, Concealed Post Connector and pins before fastening.
- .2 Custom fabricate knife plate as required to ensure upstand of plate does not extend beyond 50 x 100mm middle ply.
- .3 Place base plate in existing square timber post location and mark bolt locations with chalk on concrete. Ensure placement is in-line with beam and is at existing column location before marking.
- .4 Drill holes of suitable diameter on concrete grade beam at existing square timber post location to match base plate.
- .5 Clean out dust from holes, and install expansion anchors in accordance with manufacturers instructions.
- .6 Lay 10 mm +/- non-shrink grout pad with chamfered edges. Review with DR.
- .7 Install rubberized moisture barrier in area intended for column replacement on grout pad to suit base of post tie connector and plate connector.
- .8 Pre-drill anchor locations in member to suit concealed post tie connector, plate and pins.
- .9 Anchor concealed post tie connector and plate to concrete grade beam.
- .10 Secure wood member with pins.
- .11 Install wood plugs ensuring tight fit.

3.12 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.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA B111-[1974(R2003)] , Wire Nails, Spikes and Staples.
 - .2 CSA O121-[08] , Douglas Fir Plywood.
 - .3 CSA O141-[05(R2009)] , Softwood Lumber.
 - .4 CSA O151-[09] , Canadian Softwood Plywood.
 - .5 CAN/CSA-O325.0-[07] , Construction Sheathing.
 - .6 CAN/CSA-Z809-[08] , Sustainable Forest Management.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada [2015] (NBC).
- .3 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-[2004] , FSC Principle and Criteria for Forest Stewardship.
- .4 Green Seal Environmental Standards (GS)
 - .1 GS-11-[11] , Paints and Coatings.
- .5 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber [2010] .
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-[A2011] , Architectural Coatings.
- .7 Sustainable Forestry Initiative (SFI)
 - .1 SFI-[2010-2014] Standard.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Sustainable Design Submittals:
 - .1 Wood Certification: submit manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate

1.4 QUALITY ASSURANCE

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: by grade mark in accordance with applicable CSA standards.
- .3 Plywood sheathing identification: by grademark in accordance with applicable CSA standards.
- .4 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location, indoors, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
 - .1 CAN/CSA-O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 S2S is acceptable for
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timbers sizes: "Standard" or better grade.
- .3 Panel Materials:
 - .1 Douglas fir plywood (DFP): to CSA O121, standard construction.
 - .1 Urea-formaldehyde free.
 - .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.

- .1 Urea-formaldehyde free.
- .3 Plywood: to CAN/CSA-O325.
- .1 Urea-formaldehyde free.

2.2 ACCESSORIES

- .1 Fasteners: to CAN/CSA-G164, for applicable types of woodwork.
- .2 Nails, spikes and staples: to CSA B111.
- .3 Bolts: [12.5] mm diameter unless indicated otherwise, complete with nuts and washers.
- .4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry 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 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.
- .2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.
- .3 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .6 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.
- .7 Install sleepers as indicated.
- .8 Use caution when working with particle board. Use dust collectors and high quality respirator masks.
- .9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

- .10 Countersink bolts where necessary to provide clearance for other work.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
- .3 Waste Management: separate waste materials for reuse or recycling in accordance with 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/HPVA HP-1-[10] , American National Standard for Hardwood and Decorative Plywood.
 - .2 ANSI/BHMA A156.16 Auxiliary Hardware.
 - .3 ANSI/ASME 18.6.1 [1981 (R2012)] Wood Screws (Inch Series).
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards, [2nd] edition, [2014] .
- .3 ASTM International
 - .1 ASTM A 153/A 153M-[16] , Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM E1333-[14] Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.
 - .3 ASTM F1667-[13] Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-[M87] , Hardboard.
- .5 CSA Group (CSA)
 - .1 CSA O121-[08(R2013)] , Douglas Fir Plywood.
 - .2 CSA O151-[09(R2014)] , Canadian Softwood Plywood.
 - .3 CSA O153-[M13] , Poplar Plywood.
 - .4 CAN/CSA-Z809-[08(R2013)] , Sustainable Forest Management.
- .6 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-[2004] , FSC Principle and Criteria for Forest Stewardship.
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-[A2005] , Adhesives and Sealants Applications.
- .9 Sustainable Forestry Initiative (SFI)
 - .1 SFI-[2015-2019] Standard.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Unit Rates: Refer to the Unit Rate Table in the Invitation to Bid Documents for items pertaining to this Specification Section. Submit Unit Prices according to units and quantities shown.
- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
- .4 Shop Drawings:
 - .1 Prepare and submit shop drawings in general accordance with AWMAC AWS manual.
 - .2 Indicate profiles and dimensions, assembly techniques, jointing, methods of fastening, terminations and other related details.
 - .3 Indicate materials, thicknesses, finishes and hardware.
 - .4 Include schedule or key plan.
 - .5 Show profiles, elevations and details at scales recommended by AWMAC AWS.
 - .6 Where necessary, show location and type of blocking and backing required within supporting assemblies.
- .5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics, physical properties and requirements of referenced standards.

1.3 QUALITY ASSURANCE

- .1 Perform work of this section by Finish Carpenter with current experience similar in nature and scope to specified work.
- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00- Quality Control.
 - .2 Shop prepare one typical example of each specified item of finish carpentry, and install where directed by Departmental Representative.
 - .3 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with Work. Inspection may be completed via photographic documentation in accordance with 01 32 33 Photographic/Video Documentation.
 - .4 When accepted, mock-up will demonstrate minimum standard for Work.
 - .5 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.
 - .6 Accepted mock-up may remain as part of finished work.

1.4 DELIVERY, STORAGE AND HANDLING

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

- .2 Deliver finish carpentry materials only when area of work is enclosed, concrete work is dry, area is broom clean and site environmental conditions are acceptable for installation.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Maintain indoor temperature and humidity within range recommended by AWS for location of the Work.
 - .3 Store products on site as specified for minimum 72 hours prior to installation.
 - .4 Store and protect finish carpentry products from moisture, nicks, scratches, and blemishes.
 - .5 Replace defective or damaged materials with new.
- .4 Waste Management: for packaging and materials, in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 SUSTAINABILITY CHARACTERISTICS

- .1 Solid lumber and composite wood products: in accordance with CAN/CSA-Z809 or FSC or SFI.

2.2 QUALITY GRADE

- .1 Provide all materials and perform all work of this Section in accordance with AWMAC AWS Custom Grade, except as follows:
 - .1 Premium Grade: Handrails
- .2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.
- .3 Identify pieces of treated lumber and plywood used in preserved wood foundations by CSA O322 certification stamp.

2.3 MATERIALS

- .1 Softwood and hardwood lumber: Sound lumber to specified AWS grade requirements, kiln-dried to moisture content recommended for location of the Work.
 - .1 Machine stress-rated lumber is acceptable for all purposes.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .3 Preserved (Pressure Treated) Lumber: to CAN/CSA-S406.
 - .1 CAN/CSA-Z809 or FSC or SFI certified.
 - .2 SCAQMD Rule 1113 - Architectural Coatings.
 - .3 Preservatives: maximum VOC [350] g/L.

2.4 TRIM

- .1 Interior Standing and running trim:

- .1 Material/Grade: S-P-F Structural Select
- .2 Finish: Linseed Oil Painting System

2.5 HANDRAILS

- .1 Handrails:
 - .1 Handrail: Clear Structural Select Spruce
 - .2 Finish: Natural (untinted) Linseed Oil Wax applied to manufacturer's instructions

2.6 FLOOR BOARDS

- .1 West Addition - Tongue and Groove Floor Boards:
 - .1 Material/Grade: Structural Select Dimensional Lumber
 - .2 Species: S-P-F
 - .3 Finish: No finish
 - .4 Dimensions: Approximately 25mm x 180mm
 - .5 Profile: Tongue and Groove, match existing
- .2 West Addition - Bottom Layer Floor Boards:
 - .1 Material/Grade: Dimensional Lumber, Pressure Treated
 - .2 Species: S-P-F
 - .3 Finish: No finish
 - .4 Dimensions: Approximately 40mm x 250mm
- .3 Stall Floor Boards - Top Layer:
 - .1 Material/Grade: Structural Select Dimensional Lumber
 - .2 Species: S-P-F
 - .3 Finish: No finish
 - .4 Dimensions: Approximately 40mm x 200-300mm (widths vary)
- .4 Stall Floor Boards - Bottom Layer:
 - .1 Material/Grade: Dimensional Lumber, Pressure Treated
 - .2 Species: S-P-F
 - .3 Finish: No finish
 - .4 Dimensions: Approximately 40mm x 200-300mm (widths vary)

2.7 FASTENINGS

- .1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.
- .2 Exposed fasteners to match finish of hardware.
- .3 Nails and staples: to ASTM F1677, galvanized to ASTM A 153/A 153M for exterior work, interior humid areas; plain finish elsewhere.

- .4 Wood screws: to ANSI/ASME 18.6.1, countersunk flush type unless indicated otherwise, in sizes to suit application, galvanized to ASTM A 153/A 153M for exterior work, interior humid areas, plain for other locations.

2.8 HARDWARE

- .1 Miscellaneous Hardware: to ANSI/BHMA A156.16 as listed below:
 - .1 Handrail brackets:
 - .1 Material and Design: cast steel stand-off bracket with circular wall mount plate, as per drawings.
 - .2 Finish: Clear coat.
 - .3 Quantity: As per drawings.
 - .2 Hardware fastenings:
 - .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation of hardware.
 - .2 Exposed fastening devices to match finish of hardware.
 - .3 Use fasteners compatible with material through which they pass.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with AWS tolerances and requirements of Contract Documents.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Back prime woodwork before installation, to AWS.

3.3 INSTALLATION

- .1 Install items of finish carpentry in accordance with AWMAC AWS grade specified for respective items.
- .2 In case of conflict between Contract Documents and AWS grade requirements, Contract Documents govern.
- .3 Install items of finish carpentry at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
 - .2 Fasten and anchor securely.

- .4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
- .5 Form joints to conceal shrinkage.

3.4 CONSTRUCTION

- .1 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
 - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
 - .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .2 Standing and running trim:
 - .1 Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
 - .2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
 - .3 Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
 - .4 Install door and window trim in single lengths without splicing.
- .3 Interior and exterior frames:
 - .1 Set frames with plumb sides level heads and sills and secure.
- .4 Handrails:
 - .1 Install handrails in locations indicated.
 - .2 Make joints hair line, dowelled and glued.
 - .3 Install support brackets as indicated.
 - .4 Secure using counter sunk screws plugged with matching wood plugs.
 - .5 Fabricate in one piece and one length when practical.
 - .6 Completely shop fabricated according to approved shop drawings.
- .5 Hardware:
 - .1 Install as indicated.

3.5 CLEANING

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

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

3.6 TOUCHUP AND PROTECTION

- .1 Fill and retouch all nicks, chips and scratches in factory finishes and substrate materials to AWS standards. Replace damaged items that cannot be repaired to AWS standards.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by finish carpentry installation.
- .4 Leave work to be site finished ready for finishing by Section 09 91 23- Interior Painting .

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-Z809-08, Sustainable Forest Management.
- .2 Environmental Choice Program (ECP)
 - .1 CCD-045-95, Sealants and Caulking Compounds.
- .3 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .4 National Lumber Grading Authority (NLGA)
 - .1 NLGA Standard Grading Rules for Canadian Lumber 2010.
- .5 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Unit Rates: Refer to the Unit Rate Table in the Invitation to Bid Documents for items pertaining to this Specification Section. Submit Unit Prices according to units and quantities shown.
- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for wood siding, biscuits, adhesive and epoxy and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .4 Measured drawings:
 - .1 Submit measured drawings of existing siding profile with accuracy to the nearest 1mm. Include average dimensions and species of wood. Provide an end photo of the siding used to measure.
 - .2 A piece of the existing siding to measure will be made available through the Departmental Representative.
- .5 Shop Drawings:
 - .1 Indicate details of construction, jointing, fastening, lapping style, and other related details.
 - .1 Scales: profiles full size, details half full size.
 - .2 Indicate species of wood, sectional dimensions, and texture of wood.

1.3 QUALITY ASSURANCE

- .1 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.
- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 In a location directed by Departmental Representative prepare one example of splicing of new wood into existing stud and adjacent to this, one 1200mm x 1200mm (or size approved by Departmental Representative) section of spacing of new siding to match existing siding.
 - .2 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with Work. Inspection may be completed via photographic documentation in accordance with 01 32 33 Photographic/Video Documentation.
 - .3 When accepted, mock-up will demonstrate minimum standard for Work.
 - .4 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.
 - .5 Accepted mock-up may remain as part of finished work.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood siding from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Lumber siding: to NLGA Standard Grading Rules for Canadian Lumber.

- .1 Siding to match existing profiles and lapping styles:
 - .1 Species of wood to match existing.
 - .2 Two different profiles and lapping styles: Type-1 and Type- 2, approximately 150mm nominal vertical dimension and 19mm thickness.
 - .3 Wood: straight grain free of knots.
 - .4 Dimension to match adjoining siding in same grain direction.
Dimensions of boards may vary around the building.
- .2 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Biscuits:
 - .1 Wood species to match existing.
 - .2 Size to suit dimension of boards being spliced.
 - .3 Adhesive: as per Manufacturer's written recommendations. Must be suitable for exterior application. Technical data must be provided for approval prior to installation – see 1.2 Submittals.
- .3 Fasteners: nails to CSA B111, to match existing.
- .4 Exterior wall sheathing paper: to CAN/CGSB-51.32 single ply breathable type, 20 pound asphalt saturated building paper.
- .5 Ensure wood is kiln dried.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify and document rotted and infected boards to be removed or cut and nailing studs.
- .2 Measure typical tolerances to windows, and between butt ends of boards.
- .3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .1 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Remove window trims one piece at a time.
 - .1 Label on back each piece of trim, identifying positioning and window opening.
 - .2 Store trims in clean, protected and dry areas.

3.3 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.4 INSTALLATION

- .1 Install siding over dry substrate.
- .2 Where more than 1 board height is being replaced, install building paper over exterior face of exposed stud. Trim neatly so that no paper will be seen from interior side. Lap adjoining sheets 50mm. Insert bottom ends of sheets 25mm behind existing siding that has remained. Staple at 150mm o.c.
- .3 Apply paint pre-treatment mixture over backs, ends and fronts of boards before installation. See Section 09 03 91.13 – Conservation Treatment for Period Exterior Painting.
- .4 Fasten horizontal wood boards in lengths with original alignments.
 - .1 Do not assume that all boards are level.
 - .2 Fasten with two nails at each stud.
 - .3 Ensure that nails penetrate studs 32mm minimum.
 - .4 Where two boards are to be joined at one stud, predrill holes at angles before nailing.
 - .5 Install boards to same tolerances as existing around windows.
- .5 Preserve positioning of existing butt joints.
- .6 Reinstall all window trims to existing positions. Replace fasteners with like fasteners.
- .7 Where splicing must occur, ensure slots for biscuits are cut to be aligned and square. Biscuits must be concealed and not visible.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by wood siding installation only after consultation with Departmental Representative.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 The Aluminum Association Inc. (AAI)
 - .1 AA Aluminum Design Manual [2015] Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.
 - .2 AAI DAF45-[2003(R2009)] , Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 611-[14] Voluntary Specifications for Anodized Architectural Aluminum.
 - .2 AAMA 621-[02] Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Substrates.
 - .3 AAMA 2603-[15] , Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - .4 AAMA 2604-[13] Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - .5 AAMA 2605-[13] Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- .3 American National Standards Institute (ANSI)
 - .1 ANSI/SPRI/FM 4435/ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems [2011] .
- .4 ASTM International
 - .1 ASTM A240/A240M-[16] , Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A606/A606M-[15] , Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .3 ASTM A 653/A 653M-[15e1] , Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A755/A755M-[16e1] Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - .5 ASTM A 792/A 792M-[10(2015)] , Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .6 ASTM B32-[08(2014)] , Standard Specification for Solder Metal.

- .7 ASTM B209-[14] Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .8 ASTM B 370-[12] , Standard Specification for Copper Sheet and Strip for Building Construction.
- .9 ASTM D 523-[14] , Standard Test Method for Specular Gloss.
- .10 ASTM D1970/D1970M-[15a] Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .11 ASTM D4587-[11] Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
- .12 ASTM F1667-[15] Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-[M77] , Sheathing, Membrane, Breather Type.
- .6 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual [2012] .
- .7 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI S8-2008 Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
 - .2 CSSBI B17-2002 Barrier Series Prefinished Steel Sheet: Product Performance & Applications.
 - .3 CSSBI Sheet Steel Facts #12 [2003] Fastener Guide for Sheet Steel Building Products.
- .8 CSA Group
 - .1 CSA A123.3-[05(2015)] , Asphalt Saturated Organic Roofing Felt.
 - .2 CSA A123.22-[08(2013)] Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .9 FM Global
 - .1 Property Loss Prevention Data Sheets 1-49 Perimeter Flashing.
- .10 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .11 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
 - .1 Architectural Sheet Metal Manual (2012)
 - .2 Residential Sheet Metal Guidelines (2001)

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 including product specifications and technical data sheets for sheet metal flashing fasteners and accessory materials. Include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06- Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 Submit shop drawings for all sheet metal fabrications.
 - .2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.
 - .3 Submit manufacturer's catalogue cut sheets for manufactured items.
 - .4 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
- .4 Samples:
 - .1 Submit 300 x 300 mm duplicate samples of each type of sheet metal material, finishes and colour.

1.3 PRE-INSTALLATION MEETING

- .1 Include sheet metal flashing and trim on agenda of pre-installation meetings of affected sections.

1.4 MOCK-UPS

- .1 Include flashings in mock-ups as specified for work of other affected sections.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for recycling] in accordance with Section 01 74 19- Waste Management and Disposal .

Part 2 Products

2.1 PREFINISHED STEEL SHEET

- .1 Prefinished steel sheet with coating system consisting of base metal pre-treatment, primer, silicone modified polyester or polyester topcoat meeting requirements of CSSBI S8.
 - .1 Finished colour finished on both sides.
 - .2 Colour selected by Departmental Representative from manufacturer's full range including plain (natural finish) and metallics.

- .3 Specular gloss: 30 units +/-5 to ASTM D523
- .4 Exposed coating thickness: dry film coating system thickness not less than 22 micrometres.

2.2 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Pourable sealer: proprietary two-part polyurethane pourable sealer designed for sealing penetration pockets.
- .3 Self-adhesive membrane underlay and tie-in membrane for metal flashings: To CSA A123.22 or ASTM D1970, minimum .
- .4 Sealants: to 07 92 00
- .5 Cleats and hook strips: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .6 Nails: of same material as sheet metal, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .7 Screws: of same material as sheet metal, Suitable for substrate and material being fastened, galvanized head, neoprene washer .
- .8 Touch-up paint: as recommended by prefinished material manufacturer.

2.3 FABRICATION

- .1 Fabricate sheet steel flashings and other sheet steel work as indicated and SMACNA architectural details.
- .2 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.4 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of prefinishedgalvanized steel.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install sheet metal work as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
 - .2 Provide self-adhesive membrane to tie into adjacent assemblies.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 - .1 Flash joints as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Insert metal flashing under cap flashing to form weather tight junction.
- .8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .9 Caulk flashing at reglet and cap flashing with sealant.
- .10 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.

3.3 CLEANING

- .1 Proceed in accordance with Section 01 74 11- Cleaning .
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

3.4 SCHEDULE

- .1 Provide flashings as indicated on the drawings and in accordance with standard trade details.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
 - .1 Architectural Woodwork Standards Manual (AWS) - Edition 2.
- .2 CSA Group
 - .1 CAN/CSA-O132.5-M1992(R1998) , Stile and Rail Wood Doors.
 - .2 CAN/CSA-O141-05(R2014) , Softwood Lumber.
- .3 National Hardwood Lumber Association (NHLA)
 - .1 Rules for the Measurement & Inspection of Hardwood & Cypress 2011.
- .4 National Lumber Grading Authority (NLGA)
 - .1 NLGA Standard Grading Rules for Canadian Lumber 2014.

1.2 DEFINITIONS

- .1 Planted moulding: an applied moulding that is nailed or fixed in place after the fabrication of the work, rather than cut into the solid material.
- .2 Batten door: a wood door without stiles that is constructed of vertical boards held together by applied horizontal, and possibly vertical or diagonal, battens. A double batten door has battens on both sides.
- .3 Matchboard: Boards that have a tongue along one edge and a groove along the other; when installed, the tongue of one board fits into the corresponding groove of the adjacent board and holds it securely.

1.3 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Demonstrates: One example of splicing new wood boards into existing wood boards.
 - .2 Size: 900mm x 900mm (or size approved by Departmental Representative).
 - .3 Surfaces: ready for coatings but not treated with coatings.
- .2 Notify Departmental Representative 72 hours in advance of required inspection. Inspection may be completed via photographic documentation in accordance with 01 32 33 Photographic/Video Documentation.
- .3 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.
- .4 Approved mock-up becomes standard of acceptance for finished Work.
- .5 Approved mock-up may remain as part of finished work.

1.4 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 wood siding, biscuits, adhesive and epoxy and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Measured drawings:
 - .1 Submit measured drawings of existing siding profile with accuracy to the nearest 1mm. Include average dimensions and species of wood. Provide an end photo of the siding used to measure.
 - .2 A piece of the existing siding to measure will be made available through the Departmental Representative.
- .4 Shop Drawings:
 - .1 Indicate details of construction, jointing, fastening, lapping style, and other related details.
 - .1 Scales: profiles full size, details half full size.
 - .2 Indicate species of wood, sectional dimensions, and texture of wood.

1.5 QUALIFICATIONS

- .1 Provide corporate or individual resumés for proposed contractor and workers.
- .2 Carry out door fabrication work using skilled tradesperson trained and experienced in fabrication and installation of wood doors.
- .3 Provide documentation stating shop foreperson and personnel are of recognized standing in the industry, with a proven record of satisfactory door fabrication and installation over five years. Obtain Departmental Representative's approval of this standing.
- .4 Door fabricators: experienced in use of materials. Supply job references showing door fabrication experience of similar size and scope as this project.
- .5 Competent worker: equipped with tools and equipment necessary to carry out work in a traditional manner.
- .6 Contractor's Field Supervision and Crew Qualifications: maintain full-time supervisor/foreperson on job site during times work is in progress. Supervisor must have door fabrication training and have experience in door fabrication similar in nature and scope to specified work.
 - .1 Shop crew makeup: trade qualified journeyman carpenters and registered apprentices in the ratio of no more than one to one (at least one journeyman to one apprentice).
 - .2 Provide crew qualifications for review by Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Packaging Waste Management:
 - .1 Separate and return pallets, crates, and packaging materials of products and systems in accordance with Section 01 74 19 - Waste Management And Disposal and the Waste Management Plan to the maximum extent economically possible.
 - .2 Separate corrugated cardboard in accordance with the Waste Management Plan and place in designated areas for recycling.
 - .3 Do not burn scrap at the project site.
 - .4 Fold up metal banding, flatten, and place in designated area for recycling.

Part 2 Products

2.1 MATERIALS

- .1 Battened doors:
 - .1 Face boards to match existing profiles, sizes, and lapping styles:
 - .1 Species of wood to match existing.
 - .2 Two different sizes:
 - .1 Type-1 is approximately 120-140mm x 11mm thickness
 - .2 Type-2 is approximately 60-70mm x 11mm thickness
 - .3 Wood: straight grain free of knots.
 - .4 Dimension to match adjoining siding in same grain direction.
Dimensions of boards may vary throughout the doors.
- .2 Biscuits:
 - .1 Wood species to match existing.
 - .2 Size to suit dimension of boards being spliced.
 - .3 Adhesive: as per Manufacturer's written recommendations. Must be suitable for exterior application. Technical data must be provided for approval prior to installation – see 1.2 Submittals.
- .3 Fasteners: nails to CSA B111, to match existing.
- .4 Hardware:
 - .1 Maintain existing door hardware in working order.
- .5 Ensure wood is kiln dried.

2.2 FABRICATION FINISHING AND STORING

- .1 Store or hang doors in enclosed space with controlled ambient temperature and relative humidity.
- .2 Refinish newly exposed surfaces after fitting and cutting for hardware installation with Linseed Oil as per 09 03 91.13 – Conservation Treatment for Period Exterior.

- .3 Protect doors from scratches, handling marks and other damage.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify and document rotted and infected boards to be removed or cut and nailing studs.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .1 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Remove doors.
- .2 Ensure hardware is protected during door removal to maintain in good working order for reinstallation.

3.3 REPAIR

- .1 Remove rotted and infected boards.
- .2 Splice new boards to existing with biscuits and adhesive. Ensure slots for biscuits are cut to be aligned and square. Biscuits must be concealed and not visible. Splice joint should be angled to shed water away from the interior.
- .3 Apply paint pre-treatment mixture over backs, ends and fronts of boards before installation. See Section 09 03 91.13 – Conservation Treatment for Period Exterior Painting.

3.4 INSTALLATION

- .1 Install doors.
- .2 Reinstall existing hardware.
- .3 Adjust hardware for correct function.

3.5 ADJUSTING

- .1 Re-adjust doors and hardware just prior to completion of the building to function freely and properly.

3.6 CLEANING

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

- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by wood door installation only after consultation with Departmental Representative.

END OF SECTION

Part 1 General conservation treatment for period exterior painting 09 03 91.13

1.1 PRICE AND PAYMENT PROCEDURES

- .1 Alternates:
 - .1 Identify alternate products in writing for approval by Departmental Representative.
 - .2 Change manufacturer's brands, sources of supply of painting materials from those previously approved only on approval of Departmental Representative.
 - .3 Requests for alternate approval: in writing and accompanied by manufacturer's literature and recommendations.

1.2 REFERENCE STANDARDS

- .1 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Master Painters Institute (MPI)
 - .1 Maintenance Repainting Manual [current edition] , Master Painters Institute (MPI) including Identifiers, Evaluation, Systems, Preparation and Approved Products List.
- .4 National Fire Code of Canada (NFC), [2015] .

1.3 DEFINITIONS

- .1 Exterior surfaces: refers to surfaces of a historic structure which is exposed to exterior weather including wet conditions of rain, sleet or snow, high temperatures and sunlight as well as temperatures below the freezing point.

1.4 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 paints and coating products and include product characteristics, performance criteria, physical size, finish and limitations. Include brushes to be used. Include manufacturer's colour analysis, colour coding and approximate lead times for delivery of manufacturer custom-tinted paints.
 - .2 Submit [2] copies of WHMIS MSDS in accordance with Section [01 35 43- Environmental Procedures] [01 35 29.06- Health and Safety Requirements] .
- .3 Samples:

- .1 Submit full range of coating colour sample matches for review and selection.
- .2 Submit [2] one-litre samples of each paint delivered to site:
 - .1 [1] sample from manufacturer's containers; and,
 - .2 [1] sample from painter's pot.
 - .3 Take samples in presence of Departmental Representative.
- .3 Provide samples of above applied on wood.
- .4 Paint Distributor's address.
- .5 Brand of all products in this specification section.
- .6 Photographs of sample labels for each colour, linseed oil, and linseed oil putty.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section [01 78 00- Closeout Submittals] .
- .2 Operation and Maintenance Data: submit operation and maintenance data for [paints and coatings] for incorporation into manual.
 - .1 Provide records of products used. List products in relation to finish system and include following:
 - .1 Product name, type and use (e.g. materials and location).
 - .2 Manufacturer's product number.
 - .3 Colour code numbers and/or mixing recipe so that paint can be re-ordered again in the future without matching.
 - .4 [MPI Environmentally Friendly classification system rating]
[Environmental Rating] .
 - .5 Manufacturer's Material Safety Data Sheets.
- .3 Submit maintenance record of painting work.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Submit 4 litres of each type and colour of stain and finish coating. Identify type and colour in accordance with established colour schedule and finish system.
 - .2 Submit 8 litres of PT-1 to Departmental Representative. Identify type and colour in accordance with established colour schedule and finish system.
 - .3 Submit 2 litres of PT-2 to Departmental Representative. Identify type and colour in accordance with established colour schedule and finish system.

1.7 QUALITY ASSURANCE

- .1 Regulatory Agency Sustainability Approvals:
 - .1 Compliance Report indicating requirement to purchase energy efficient and environmentally friendly products.
 - .2 Conform to applicable standards and requirements for exterior repainting work including cleaning, preparation and priming.

- .3 Retain purchase orders, invoices and other documents and produce when requested by Departmental Representative.
- .2 Confirm with manufacturer special procedures and methods for linseed oil painting on existing and new wood.
- .3 Qualifications:
 - .1 Contractor: Perform work of this section by Painter with current experience similar in nature and scope to specified work.
 - .2 Qualified journeypersons: as identified by local jurisdiction.
 - .3 Apprentices: work under direct supervision of qualified journeyperson in accordance with applicable trade regulations.
- .4 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00- Quality Control.
 - .2 Provide following mock-ups in locations directed by Departmental Representative:
 - .1 Location with both existing and new wood siding.
 - .2 Exterior location with both existing and new wood logs, chinking, and daubing.
 - .3 The intent of the mock-up demonstration is to verify the consistency of colours, matching of colours, thinness of painting coats, quality of brushwork, and understanding of methods, procedures and products.
 - .4 Inform the Departmental Representative a minimum of 2 weeks before demonstration of mock-up. Photos and videos of application of pre-treatment mixture are to be sent a minimum of one week before demonstration date. Photos and videos should demonstrate application of pre-treatment mixture in-situ with adequate heating and hoarding if necessary. Photos or videos should demonstrate measuring of temperature of pre-treatment mixture and surfaces receiving applications. Photos or video should demonstrate understanding of absorption of pre-treatment mixture into the woods. At least one photo is to verify the location of the mock-up in relationship to the rest of the building. Demonstration of linseed oil painting skills in the physical presence of the Departmental Representative should show:
 - .1 Weather and dust-protecting enclosures;
 - .2 Temperature and relative humidity taking;
 - .3 Ability to mix paint adequately on-site;
 - .4 Saturation of wood with pre-treatment mixture with final application;
 - .5 Mixing, understanding and application of slurry for knots;
 - .6 Understanding and mixing of custom-tinted paint from manufacturer;
 - .7 Understanding of consequences of thinning paint;
 - .8 Types of brushes and brushing technique; and,
 - .9 Measurement and understanding of thickness of paint coat.
 - .5 When accepted, mock-up demonstrates minimum standard for this work. Mock-up may remain as part of finished work.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Labels: to indicate:
 - .1 Type of paint or coating.
 - .2 Compliance with applicable standard.
 - .3 Colour number in accordance with established colour schedule.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect paints and coatings.
 - .3 Keep areas for storage, cleaning and preparation, clean and orderly.
 - .4 Remove paint materials from storage in quantities required for same day use.
 - .5 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
 - .6 Store materials and equipment within temperature range between 7 degrees C to 30 degrees C.
 - .7 Store materials and supplies away from heat generating devices and sensitive materials above minimum temperature as recommended by manufacturer.
 - .8 Replace defective or damaged materials with new.
- .4 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
 - .1 Provide adequate storage for rags soaked with linseed oil as the rags may spontaneously combust.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).
- .5 Develop Waste Reduction Workplan related to Work of this Section.
- .6 Packaging Waste Management: remove as specified in Waste Reduction Workplan in accordance with Section 01 74 19- Waste Management and Disposal.

1.9 AMBIENT CONDITIONS

- .1 Substrate and ambient temperatures: in accordance with limits prescribed in paint standard by manufacturer.

- .2 Apply paint finish in areas where:
 - .1 Dust is no longer being generated by related construction operations.
 - .2 Wind conditions are such that airborne particles will not affect quality of finished surface.
 - .3 The site is very windy. Dust, insects and particles adhere and become embedded in the paint. Linseed oil paints take longer to dry. Develop a strategy to mitigate embedded particles and insects.
- .3 Substrate and ambient air temperature, humidity and moisture content levels:
 - .1 Do not perform repainting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C, unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are expected to fall outside paint manufacturer's prescribed limits.
 - .4 Substrate is wet, damp or frosted.
 - .5 Maximum moisture content of substrate exceeds: 12 % for concrete and unit masonry.
 - .6 Maximum moisture content of substrate exceeds: 15 % for wood.
 - .7 Maximum moisture content of substrate exceeds: 12 % for stucco.
 - .8 Relative humidity is above 85 %.
 - .9 Dew point is less than 3 degrees C variance between air/surface temperature.
 - .10 Precipitation is forecast to occur before paint has thoroughly cured.
 - .11 It is foggy, misty, raining, icing or snowing at site.
 - .2 Damp and cold weather conditions:
 - .1 Provide and maintain cover for paint finish.
 - .2 Heat substrates and surrounding air to comply with temperature and humidity conditions required.
 - .3 Protect until paint is dry.
 - .4 Protect until weather conditions are suitable.
- .4 Perform work on surfaces exposed to direct, intense sunlight in early morning. If surfaces are hoarded, paint may take longer to dry.

Part 2 Products

2.1 MATERIALS

- .1 Linseed Oil Paint Stytem: in accordance with paint manufacturer's printed instructions.
- .2 Pre-treatment mixture: Pure, raw linseed oil.
 - .1 Clean, filtered, purified raw linseed oil containing no proteins, no additives, no VOCs.

- .2 Minimum 5 applications of raw linseed oil to wood and metal surfaces. Existing wood that is dry may require many more applications of linseed oil pre-treatment. Lower temperatures may affect absorption rates and require additional applications. Locally directed heat can improve absorption of oil.
- .3 Linseed Oil Paints:
 - .1 Cold-pressed, filtered, solvent-free, 100% linseed oil plus pigment, no VOCs.
 - .2 Minimum 5 coats (at 100 microns thick when wet) of linseed oil paint to wood and metal surfaces. Wood that has not soaked up enough pre-treatment mixture may require additional coats. End grains may require additional coats. Cold conditions may lengthen drying times between coats.
- .4 Linseed Oil Slurry:
 - .1 Mix of linseed oil putty and raw linseed oil.
 - .2 Linseed oil putty to be organic, pure, raw linseed oil and pure chalk, no additives, no VOCs, or approved equivalent.

2.2 COLOURS

- .1 Colour Schedule to be provided by Departmental Representative.
- .2 Refer to elevation drawings.
- .3 Obtain written approval from Departmental Representative for change in Colour Schedule.

2.3 MIXING AND TINTING

- .1 Pigment to manufacturer's written instructions .
- .2 Vehicle to manufacturer's written instructions .
- .3 Colouring matter to manufacturer's written instructions.
- .4 Perform colour tinting operations prior to delivery of paint to site.
- .5 Obtain Departmental Representative's written approval for on-site tinting of paint materials. Approval of on-site tinting to be accompanied by a Paint Mixing Method and Procedures Plan and a Paint Application Plan. The Paint Mixing Method and Procedures Plan is to describe the method and procedures to be used (including mixing ratios, mixing procedures and testing methods to minimize variations) as well as environmental conditions of where the paint is to be mixed. The Paint Application Plan is to describe how inconsistencies of paints mixed-on-site are to be minimized.
- .6 Reproduce historic paint colour using compatible materials meeting current standards. Colour samples of Bar U Red and Bar U White will be provided by the Departmental Representative.
- .7 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .8 Where thinner is used, addition not to exceed paint manufacturer's recommendations.
- .9 Do not use kerosene or other organic solvents to thin water-based paints.

- .10 Thin paint in accordance with paint manufacturer's recommendations.
 - .1 Obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .11 Re-mix paint in containers prior to and during application. Ensure break-up of lumps, complete dispersion of settled pigment, and colour uniformity.

2.4 ACCESSORIES

- .1 Use tools that do not damage adjacent materials or raised grain of aged wood.
- .2 Pre-treatment mixture and linseed oil paint require stiff, natural bristles. Linseed oil paint should be applied in thin coats for two reasons: to preserve the texture of the wood, and to minimize drying times. Natural, stiff brushes accomplish this most effectively.
- .3 Obtain approval of Departmental Representative for use of other tools.
- .4 Use tools that do not damage adjacent materials.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for painting in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative. Ensure daubing is dry. Additional coats of paint may be required over daubing.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Ensure workers are kept safe in accordance with Federal, Provincial, and Municipal regulations and as per Reviewed Safety Plan.
- .2 Implement safety measures as required in preparation for implementing work.
- .3 Place safety devices and signage in locations as required by Reviewed Safety Plan and in accordance with Federal, Provincial, Municipal regulations.
- .4 Ensure enclosure is of adequate temperatures.

3.3 PROTECTION OF IN-PLACE CONDITIONS

- .1 Protect existing building surfaces and adjacent structures against paint spatters, markings and other damage.
- .2 Protect factory finished products and equipment.
- .3 Remove and safely secure and store light fixtures, surface hardware on doors, and surface mounted equipment, fittings and fastenings prior to undertaking painting operations.

- .4 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting progresses.
- .5 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas.
- .6 Protect drying paint from wind-borne dust, weather elements, unsatisfactory temperatures, and insects.

3.4 SURFACE PREPARATION

- .1 Perform preparation and operations for exterior painting in accordance with [MPI] Maintenance Repainting Requirements except where specified otherwise.
- .2 Clean and prepare exterior surfaces in accordance with [MPI Maintenance Repainting] Manual requirements. Refer to manual for specific requirements as follows:
 - .1 Remove dust, dirt, and surface debris by brushing, wiping with dry, clean cloths.
 - .2 Wash surfaces with soap and clean warm water using a stiff bristle brush. Remove dirt, oil and surface contaminants. Ensure existing substrate is not damaged by process.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and dry thoroughly.
 - .5 Use water-based cleaners for surfaces to be repainted using water based paints.
- .3 Clean metal surfaces: remove rust, dirt, oil, grease and foreign substances in accordance with [MPI] requirements.
 - .1 Remove contaminants from surfaces, pockets and corners: blow with clean dry compressed air, brush with clean brushes, vacuum as required.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before priming.
- .5 Touch-up, spot prime, and apply primer, paint, or pre-treatment immediately after cleaning.
- .6 Obtain written approval of prepared surfaces by Departmental Representative before applying paint.

3.5 APPLICATION

- .1 Apply pre-treatment mixture to wood:
 - .1 Brush on applications of raw linseed oil. Oil may be warmed for better penetration into wood. Brush-out pooling of oil.
 - .2 When absorbed, repeat application of oil.
 - .3 Continue applications of oil until oil starts to pool on surface. Brush away pooling. Different wood areas may absorb oil differently and may need more applications.
 - .4 Allow a minimum of 5 applications of wood.

- .5 Apply slurry to knots and small penetrations such as nail heads. Allow slurry to dry to touch.
- .6 Once wood has stopped absorbing oil, leave to dry 24 hours. Enclosed or cold areas may require more time.
- .2 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- .3 Apply paint materials in accordance with paint manufacturer's written application instructions. Ensure pre-treatment mixture and slurry is dry.
 - .1 Apply paint:
 - .1 To adequately prepared surfaces and within moisture limits.
 - .2 When previous coat of paint is dry and adequately cured.
 - .3 In accordance with manufacturer's written instructions.
 - .2 Apply a minimum of 3 coats of paint over worn painted areas, or new wood.
 - .3 Apply each coat about 150 micros.
 - .1 Use a wet film measuring tool to verify thicknesses.
- .4 Apply paint with stiff brushes.
 - .1 Obtain Departmental Representative's approval of application method before commencing work.
- .5 Brush Application:
 - .1 Work paint into cracks, crevices and corners.
 - .2 Brush out runs and sags, and overlap marks.
 - .3 Remove runs and sags from finished work and repaint.

3.6 FIELD QUALITY CONTROL

- .1 Standard of acceptance:
 - .1 When viewed using natural prevailing sunlight at peak period of day (mid-day) on surface viewed, surfaces to indicate following:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Soffits: no defects visible from grade at 45 degrees to surface.
 - .3 Final coat: to exhibit uniformity of colour and sheen across full surface.
- .2 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved by Departmental Representative.
- .3 Co-operate with Paint Inspection Agency and provide access to areas of work.
- .4 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.

- .5 Conduct moisture tests on substrates.
 - .1 Use calibrated electronic moisture meter.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Reinstall and clean removed items after painting is completed.
- .3 Remove paint where spilled, splashed, or splattered as work progresses using means and materials that are not detrimental to affected surfaces.
 - .1 Clean and restore as directed by Departmental Representative.
- .4 Wipe spills and spots immediately with a damp cloth.
- .5 Minimize use of kerosene and organic solvents to clean up water-based paints.
- .6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.
- .7 Waste Management: separate waste materials for recycling or reuse in accordance with 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Separate coating products waste in accordance with Waste Management Plan and place in designated areas for disposal or recycling.
 - .3 Place materials defined as hazardous or toxic waste in designated containers.
 - .4 Seal and store emptied containers safely away from children for disposal.
 - .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.
 - .6 Treat non-reusable materials as hazardous waste and dispose of legally off site.
 - .7 Place excess cleaners, thinners, solvents and paint in designated containers and dispose of legally off site.
 - .8 Reduce the amount of contaminants entering waterways, sanitary/storm drain systems and into the ground. Adhere to following procedures:
 - .1 Retain cleaning water for water-based materials. Allow sediments to be filtered out. Do not use free-draining water to clean equipment.
 - .2 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .3 Dry empty paint cans prior to disposal or recycling.
 - .4 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store product in well-ventilated fire-safe area at moderate temperature.
 - .9 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling facility.

- .10 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials, and debris.
- .11 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with Federal, Provincial and Municipal regulations.
- .12 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials, paints, thinners, paint removers/strippers in accordance with Federal, Provincial and Municipal regulations.
- .13 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Dispose of sediment remaining from cleaning operations in accordance with Federal, Provincial and Municipal regulations.

3.8 HARDWARE RE-INSTALLATION

- .1 Clean and re-install hardware items removed and stored previous to commencement of the Work.
- .2 Re-install hardware items in original locations.

3.9 PROTECTION

- .1 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.
- .2 Remove paint splashings on exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .3 Protect completed work from paint droppings. Use non-staining coverings.
- .4 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.
- .5 Remove protective coverings and warning signs as soon as practical after operations cease.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Master Painters Institute (MPI)
 - .1 Maintenance Repainting Manual [current edition] , Master Painters Institute (MPI) including Identifiers, Evaluation, Systems, Preparation and Approved Products List.
- .4 National Fire Code of Canada (NFC), [2015] .

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
 - .1 Submit work schedule for various stages of painting to Departmental Representative for review. Provide schedule minimum of 48 hours in advance of proposed operations.
 - .2 Obtain written authorization from Departmental Representative for changes in work schedule.
 - .3 Schedule new additions to existing building, coordinate painting operations with other trades.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for paints and coating products and include product characteristics, performance criteria, physical size, finish and limitations. Include brushes to be used. Include manufacturer's colour analysis, colour coding and approximate lead times for delivery of manufacturer custom-tinted paints.
 - .2 Submit [2] copies of WHMIS MSDS in accordance with Section [01 35 43- Environmental Procedures] [01 35 29.06- Health and Safety Requirements] .
- .3 Samples:
 - .1 Submit full range of coating colour sample matches for review and selection.
 - .2 Submit [2] one-litre samples of each paint delivered to site:
 - .1 [1] sample from manufacturer's containers; and,
 - .2 [1] sample from painter's pot.
 - .3 Take samples in presence of Departmental Representative.

- .3 Provide samples of above applied on wood.
- .4 Paint Distributor's address.
- .5 Brand of all products in this specification section.
- .6 Photographs of sample labels for each colour, linseed oil, and linseed oil putty.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide in accordance with Section 01 78 00- Closeout Submittals.
- .2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.
- .3 Include:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour number[s] .
 - .4 MPI Environmentally Friendly classification system rating.
- .4 Submit maintenance record of painting work.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.
 - .2 Submit one four litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: Perform work of this section by Painter with current experience similar in nature and scope to specified work.
 - .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
 - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
 - .4 Conform to latest MPI requirements for exterior painting work including preparation and priming.
 - .5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
 - .6 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
 - .7 Standard of Acceptance:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

- .2 Soffits: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .2 Mock-Ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00- Quality Control.
 - .1 Interior location that demonstrates painting of plywood, log, log strips, and wood plank walls
 - .2 Mock-up will be used:
 - .1 To verify the consistency of colours, matching of colours, thinness of painting coats, quality of brushwork, and understanding of methods, procedures and products.
 - .3 Contractor is to propose area for mock-up for approval by Departmental Representative prior to conducting work.
 - .4 Allow 72 hours for inspection of mock-up before proceeding with Work. Digital photographs may substitute for in-person review by Departmental Representative.
 - .5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section and with manufacturer's written instructions 01 61 00- Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Labels: to indicate:
 - .1 Type of paint or coating.
 - .2 Compliance with applicable standard.
 - .3 Colour number in accordance with established colour schedule.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Observe manufacturer's recommendations for storage and handling.
 - .3 Store materials and supplies away from heat generating devices.
 - .4 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
 - .5 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.
 - .6 Remove paint materials from storage only in quantities required for same day use.

- .7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .8 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .1 Provide adequate storage for rags soaked with linseed oil as the rags may spontaneously combust.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).

1.8 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
 - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Provide continuous ventilation for 7 days after completion of application of paint.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 - .5 Provide minimum lighting level of 323 Lux on surfaces to be painted.
 - .6 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless pre-approved written approval by Paint Inspection Agency Authority and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
 - .4 The relative humidity is under 85 % or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the

- ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
- .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 - .2 Perform painting work when maximum moisture content of the substrate is below:
 - .1 12 % for concrete and masonry (clay and concrete brick/block). Allow new concrete and masonry to cure minimum of 28 days.
 - .2 15 % for hard wood.
 - .3 17 % for soft wood.
 - .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
 - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
 - .7 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
 - .8 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

- .1 Linseed Oil Paint System: in accordance with paint manufacturer's printed instructions.
- .2 Pre-treatment mixture: Pure, raw linseed oil.

- .1 Clean, filtered, purified raw linseed oil containing no proteins, no additives, no VOCs.
- .2 Minimum 5 applications of raw linseed oil to wood and metal surfaces. Existing wood that is dry may require many more applications of linseed oil pre-treatment. Lower temperatures may affect absorption rates and require additional applications. Locally directed heat can improve absorption of oil.
- .3 Linseed Oil Paints:
 - .1 Cold-pressed, filtered, solvent-free, 100% linseed oil plus pigment, no VOCs.
 - .2 Minimum 5 coats (at 100 microns thick when wet) of linseed oil paint to wood and metal surfaces. Wood that has not soaked up enough pre-treatment mixture may require additional coats. End grains may require additional coats. Cold conditions may lengthen drying times between coats.
- .4 Linseed Oil Slurry:
 - .1 Mix of linseed oil putty and raw linseed oil.
 - .2 Linseed oil putty to be organic, pure, raw linseed oil and pure chalk, no additives, no VOCs, or approved equivalent.

2.2 COLOURS

- .1 Colour schedule will be based upon selection of (2) different colours, to be provided by Departmental Representative at later date.
- .2 Refer to interior elevation drawings.
- .3 Obtain written approval from Departmental Representative for change in Colour Schedule.

2.3 MIXING AND TINTING

- .1 Pigment to manufacturer's written instructions .
- .2 Vehicle to manufacturer's written instructions .
- .3 Colouring matter to manufacturer's written instructions.
- .4 Perform colour tinting operations prior to delivery of paint to site.
- .5 Obtain Departmental Representative's written approval for on-site tinting of paint materials. Approval of on-site tinting to be accompanied by a Paint Mixing Method and Procedures Plan and a Paint Application Plan. The Paint Mixing Method and Procedures Plan is to describe the method and procedures to be used (including mixing ratios, mixing procedures and testing methods to minimize variations) as well as environmental conditions of where the paint is to be mixed. The Paint Application Plan is to describe how inconsistencies of paints mixed-on-site are to be minimized.
- .6 Reproduce historic paint colour using compatible materials meeting current standards. Colour samples of Bar U Red and Bar U White will be provided by the Departmental Representative.
- .7 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .8 Where thinner is used, addition not to exceed paint manufacturer's recommendations.

- .9 Do not use kerosene or other organic solvents to thin water-based paints.
- .10 Thin paint in accordance with paint manufacturer's recommendations.
 - .1 Obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .11 Re-mix paint in containers prior to and during application. Ensure break-up of lumps, complete dispersion of settled pigment, and colour uniformity.

2.4 INTERIOR PAINTING SYSTEMS

- .1 Dimension lumber: columns, beams, exposed joists, underside of decking:
 - .1 To remain unfinished.
- .2 Dressed lumber: including doors, door and window frames, casings, mouldings, horizontal plank partitions:
 - .1 Linseed Oil Paint System: in accordance with paint manufacturer's printed instructions.
- .3 Wood paneling and casework: partitions, panels, shelving, millwork:
 - .1 Linseed Oil Paint System: in accordance with paint manufacturer's printed instructions.

2.5 ACCESSORIES

- .1 Use tools that do not damage adjacent materials or raised grain of aged wood.
- .2 Pre-treatment mixture and linseed oil paint require stiff, natural bristles. Linseed oil paint should be applied in thin coats for two reasons: to preserve the texture of the wood, and to minimize drying times. Natural, stiff brushes accomplish this most effectively.
- .3 Obtain approval of Departmental Representative for use of other tools.
- .4 Use tools that do not damage adjacent materials.

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 data sheet.

3.2 GENERAL

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for painting in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative. Ensure daubing is dry. Additional coats of paint may be required over daubing.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.4 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
 - .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .2 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths.
 - .2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
- .3 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .4 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

- .6 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by vacuum cleaning.
- .7 Touch up of shop primers with primer as specified.
- .8 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 EXISTING CONDITIONS

- .1 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test" and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .2 Maximum moisture content as follows:
 - .1 Concrete: 12 %.
 - .2 Hard Wood: 15 %.
 - .3 Soft Wood: 17%.

3.6 APPLICATION

- .1 Apply pre-treatment mixture to wood:
 - .1 Brush on applications of raw linseed oil. Oil may be warmed for better penetration into wood. Brush-out pooling of oil.
 - .2 When absorbed, repeat application of oil.
 - .3 Continue applications of oil until oil starts to pool on surface. Brush away pooling. Different wood areas may absorb oil differently and may need more applications.
 - .4 Allow a minimum of 5 applications of wood.
 - .5 Apply slurry to knots and small penetrations such as nail heads. Allow slurry to dry to touch.
 - .6 Once wood has stopped absorbing oil, leave to dry 24 hours. Enclosed or cold areas may require more time.
- .2 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- .3 Apply paint materials in accordance with paint manufacturer's written application instructions. Ensure pre-treatment mixture and slurry is dry.
 - .1 Apply paint:
 - .1 To adequately prepared surfaces and within moisture limits.
 - .2 When previous coat of paint is dry and adequately cured.
 - .3 In accordance with manufacturer's written instructions.
 - .2 Apply a minimum of 3 coats of paint over worn painted areas, or new wood.
 - .3 Apply each coat about 150 micros.

- .1 Use a wet film measuring tool to verify thicknesses.
- .4 Apply paint with stiff brushes.
 - .1 Obtain Departmental Representative's approval of application method before commencing work.
- .5 Brush Application:
 - .1 Work paint into cracks, crevices and corners.
 - .2 Brush out runs and sags, and overlap marks.
 - .3 Remove runs and sags from finished work and repaint.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Do not paint over nameplates.
- .5 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .6 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .7 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .8 Do not paint interior transformers and substation equipment.

3.8 SITE TOLERANCES

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.9 FIELD QUALITY CONTROL

- .1 Standard of acceptance:
 - .1 When viewed using natural prevailing sunlight at peak period of day (mid-day) on surface viewed, surfaces to indicate following:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Soffits: no defects visible from grade at 45 degrees to surface.
 - .3 Final coat: to exhibit uniformity of colour and sheen across full surface.

- .2 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved by Departmental Representative.
- .3 Co-operate with Paint Inspection Agency and provide access to areas of work.
- .4 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.
- .5 Conduct moisture tests on substrates.
 - .1 Use calibrated electronic moisture meter.

3.10 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Reinstall and clean removed items after painting is completed.
- .3 Remove paint where spilled, splashed, or splattered as work progresses using means and materials that are not detrimental to affected surfaces.
 - .1 Clean and restore as directed by Departmental Representative.
- .4 Wipe spills and spots immediately with a damp cloth.
- .5 Minimize use of kerosene and organic solvents to clean up water-based paints.
- .6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.
- .7 Waste Management: separate waste materials for recycling or reuse in accordance with 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Separate coating products waste in accordance with Waste Management Plan and place in designated areas for disposal or recycling.
 - .3 Place materials defined as hazardous or toxic waste in designated containers.
 - .4 Seal and store emptied containers safely away from children for disposal.
 - .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.
 - .6 Treat non-reusable materials as hazardous waste and dispose of legally off site.
 - .7 Place excess cleaners, thinners, solvents and paint in designated containers and dispose of legally off site.
 - .8 Reduce the amount of contaminants entering waterways, sanitary/storm drain systems and into the ground. Adhere to following procedures:
 - .1 Retain cleaning water for water-based materials. Allow sediments to be filtered out. Do not use free-draining water to clean equipment.

- .2 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .3 Dry empty paint cans prior to disposal or recycling.
- .4 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store product in well-ventilated fire-safe area at moderate temperature.
- .9 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling facility.
- .10 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials, and debris.
- .11 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with Federal, Provincial and Municipal regulations.
- .12 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials, paints, thinners, paint removers/strippers in accordance with Federal, Provincial and Municipal regulations.
- .13 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Dispose of sediment remaining from cleaning operations in accordance with Federal, Provincial and Municipal regulations.

3.11 RESTORATION

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

3.12 PROTECTION

- .1 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.
- .2 Remove paint splashings on exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .3 Protect completed work from paint droppings. Use non-staining coverings.
- .4 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

- .5 Remove protective coverings and warning signs as soon as practical after operations cease.

END OF SECTION

1. General

1.1. REFERENCES

1. Environmental Choice Program (ECP)
 1. CCD04798(R2005), Architectural Surface Coatings.
 2. CCD04898(R2006), Surface Coatings Recycled Waterborne.
2. Federal Standard (FS)
 1. FED-STD595B89, Colours Used in Government Procurement.
3. The Society for Protective Coatings (SSPC)
 1. SSPCSP 182(R2004), Solvent Cleaning.
 2. SSPCSP 282(R2004), Hand Tool Cleaning.
 3. SSPCSP 382(R2004), Power Tool Cleaning.
 4. SSPCSP 6/NACE No. 3 07, Commercial Blast Cleaning.
 5. SSPCSP 7/NACE No. 4 07, Brushoff Blast Cleaning.
 6. SSPCVis 89, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 Surface Preparation Specs.).
 7. SSPC-SP 10/NACE No. 2-07, Near White Blast Cleaning.
 8. SSPC-PA 2 04, Measurement of Dry Coat Thickness with Magnetic Gauges.
 9. SSPC Good Painting Practices, Volume 1, 4th Edition.

1.2. ACTION AND INFORMATIONAL SUBMITTALS

1. Submit in accordance with Section 01 33 00 Submittal Procedures.
2. Product Data:
 1. Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and include product characteristics, performance criteria, physical size, finish and limitations.
 2. Submit 2 copies of WHMIS MSDS to Contract Administrator.
3. Samples:
 1. Submit for review and acceptance of each unit.
 2. Samples will be returned for inclusion into work.
4. Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
5. Test Reports:
 1. Submit test reports showing compliance with specified performance characteristics and physical properties and in accordance with Section 01 45 00 Quality Control.

1.3. QUALITY ASSURANCE

1. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
2. Reports: Painting Contractor to take thickness measurements of intermediate and finish coats to confirm that specified Dry Film Thickness (DFT) is achieved in accordance to manufacturer's specifications.
3. Contractor Qualifications: Company specializing in the application of the Products specified in this section.

1.4. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

2. Products

2.1. MATERIALS

1. Paint:
 1. Primer: epoxy, exterior; first coat. G5 finish, 3-4mil DFT.
 - .1 **Standard of Acceptance:**
 - .1 Macropoxy 646 Fast Cure Epoxy Part , by Sherwin Williams or approved equal in accordance with B7.
 2. Finish Coat: aliphatic urethane, final coat. G4 finish. 3-4mil DFT.
 - .1 **Standard of Acceptance:**
 - .1 Corothane II Low VOC Polyurethane, by Sherwin Williams or approved equal in accordance with B7.

3. Execution

3.1. EXAMINATION

1. Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for painting exterior metal surfaces installation in accordance with manufacturer's written instructions.
 1. Visually inspect substrate in presence of prior to the commencement of any work.
 2. Inform Contract Administrator of unacceptable conditions immediately upon discovery.
 3. Proceed with installation only after unacceptable conditions have been remedied. Commencement of work signifies acceptance of the substrate condition.

3.2. PREPARATION

1. New metal surfaces Preparation:

1. Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with the following:
 1. Commercial blast cleaning: to SSPCSP 6.
 2. Solvent cleaning: to SSPCSP 1.
 3. Hand tool cleaning: to SSPCSP 2.
 4. Power tool cleaning: to SSPCSP 3.
 5. Brushoff blast cleaning: to SSPCSP 7.
 6. Near White Blast Cleaning: to SSPC-SP 10/NACE No. 2.
 7. Galvanized metal cleaner:
 - .1 Standard of Acceptance:
 - .1 #4110 Paint Prep Cleaner from Hi Lite SolutionsCompressed air to be free of water and oil before reaching nozzle.
2. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.
3. Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPCVis1.
 1. Apply primer, paint, or pretreatment after surface has been cleaned and before deterioration of surface occurs.
 2. Clean surfaces again if rusting occurs after completion of surface preparation.
4. Mixing paint:
 1. Do not dilute or thin paint for brush application.
 2. Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.
 3. Do not mix or keep paint in suspension by means of air bubbling through paint.
 4. Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Contract Administrator.
5. Number of paint coats: 4.
 1. New metal surfaces.
 1. Shop: 2 primer coats to minimum dry film thickness of 35 microns per coat.
 2. Field: 2 alkyd enamel coats to minimum dry film thickness of 25 microns per coat.

1.2. APPLICATION

1. Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

2. Apply paint by spraying only. Brushing may be used for touch-ups on final finish coat. Use sheepskins or daubers when no other method is practical in places of difficult access.
3. Use dipping or roller coating method of application when specifically authorized by Contract Administrator in writing.
4. Caulk open seams at contact surfaces of built up members with material approved by Contract Administrator, before second undercoat of primer is applied.
5. Where surface to be painted is not under cover, do not apply paint when:
 1. Air temperature is below 5 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.
 2. Temperature of surface is over 40 degrees C unless paint is specifically formulated for application at high temperatures.
 3. Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
 4. Surface to be painted is wet, damp or frosted.
 5. Previous coat is not dry.
6. Supply cover when paint must be applied in damp or cold weather. Supply, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable.
7. Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
8. Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
9. Brush application (only when components are not accessible for spray application):
 1. Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.
 2. Brush out runs and sags.
 3. Remove runs, sags and brush marks from finished work and repaint.
10. Spray application:
 1. Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 2. Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
 3. Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 4. Apply paint in uniform layer, with overlapping at edges of spray pattern.
 5. Brush out immediately runs and sags.
 6. Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
 7. Remove runs, sags and brush marks from finished work and repaint.

11. Shop painting:

1. Do shop painting after fabrication and before damage to surface occurs from weather or other exposure.
2. Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.
3. Do not paint metal surfaces which are to be embedded in concrete.
4. Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.
5. Do not paint metal within 50 mm of edge to be welded. Give unprotected steel one coat of approved primer or protective coating after shop fabrication is completed.
6. Remove weld spatter before painting. Remove weld slag and flux to be repainted.
7. 'Stripe' all weld joints with primer prior to applying intermediate paint coats.
8. Protect machine finished or similar surfaces that are not to be painted but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide.
9. Copy previous erection marks and weight marks on areas that have been shop painted.

12. Handling painted metal:

1. Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
2. Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

1.3. FIELD QUALITY CONTROL

1. Site Tests, Inspections:

1. Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPCPA 2.

1.4. CLEANING

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

1.5. PROTECTION

1. Protect painted surfaces from damage during construction.
2. Protection of surfaces:
 1. Protect surfaces not to receive paint.
 2. Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.
 3. Protect cleaned and freshly painted surfaces from dust.

3. Repair damage to adjacent materials caused by painting exterior metal surface application installation.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for Yard Hydrants Curb Stops
- .3 Shop Drawings:
 - .1 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .2 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.
 - .3 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data
 - .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 1 digital copy of the Operation and Maintenance Manual for review by consultant in advance of the hard copy draft submission.
 - .2 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval.
 - .3 Make changes as required and re-submit as directed by Consultant and 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 Departmental Representative will provide 1 set of reproducible mechanical drawings. 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 start of Testing, Adjusting and Balancing for HVAC, 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 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for code complaint installation.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant and Departmental Representative.

3.2 PAINTING REPAIRS AND RESTORATION

- .1 Coordinate work with other restorations work.

3.3 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.4 FIELD QUALITY CONTROL

- .1 Site Tests: Flush Domestic line and submit water bacteria tests to Departmental Representative after completion.

3.5 CLEANING

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

3.6 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .2 CSA Group (CSA)
 - .1 CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers
- .3 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada 2015 (NPC).

Part 2 Products

2.1 NON-FREEZE YARD HYDRANT

- .1 Deck type with polished bronze box with lockable handle, Coordinate with exiting elevations to supply sufficient riser heights.

2.2 VACUUM BREAKERS

- .1 Breakers: to CSA-B64 Series, vacuum breaker hose connection.

2.3 CURB STOP VALVES

- .1 Curb Stops:
 - .1 Curb Stops to be of brass construction. Balls to be Teflon coated brass or industrial chrome plated stainless steel c/w Teflon seats. Body to be red brass without drain. Inlets and outlets to compression type fittings suitable for the specified pipe. Valves to be full port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.
 - .2 Approved Products:
 - Cambridge Brass c/w Successor outlet for sizes 20, 25, 38 and 50 mm diameter.
 - A.Y. McDonald Mfg. "Q" Compression outlet for sizes 20, 25, 38 and 50mm diameter.
 - Ford B44 c/w "pack joint" outlet for sizes 20, 25, 38 and 50mm diameter.

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 data sheet.

3.2 INSTALLATION

- .1 Install in accordance with National Plumbing Code of Canada (NPC), provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.3 NON-FREEZE YARD HYDRANT

- .1 Support to exiting Fence Posts supply 1m x 1m x 150mm of washed rock in surface around hydrant.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA B137.5-13, Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 National Research Council (NRC)
 - .1 National Plumbing Code of Canada (NPC) 2015.

Part 2 Products

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.
 - .1 Buried or embedded:
 - .1 PEX Piping to CSA B137.5.

2.2 FITTINGS

- .1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS 2 and larger:
 - .1 ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
 - .2 PEX fittings to CSA B137.5 and F1960.
- .6 NPS 1 ½ and smaller:
 - .1 PEX fittings to CSA B137.5.

2.3 JOINTS

- .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Teflon tape: for threaded joints.
- .4 NPS 1 ½ and smaller: PEX fittings to CSA B137.5.
- .5 Coupling and T Fittings: Stainless Steel.

Part 3 Execution

3.1 APPLICATION

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

3.2 INSTALLATION

- .1 Install in accordance with NPC.
- .2 Buried tubing:
 - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
 - .2 Bend tubing without crimping or constriction. Minimize use of fittings.

3.3 FLUSHING AND CLEANING

- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean copper to Provincial and Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.
- .2 Refill cister with fresh treated water after testing

3.4 DISINFECTION

- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and Departmental Representative.
- .2 Upon completion, provide laboratory test reports on water quality for Departmental Representative and Consultant approval.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

1.2 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for Wire and Cable boxes, Electrical Devices, Panel Boards, Breakers Lighting.
- .3 Shop drawings:
 - .1 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .3 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .4 Samples:
 - .1 Provide a mock-up construction sample of the lighting installation to show the following work scopes and products:
 - .1 Wiring from the proposed switches to light fixtures
 - .2 Switch box and switch
 - .3 Lighting outlet box and light fixture.
- .5 Certificates:
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment is not available, submit such equipment to authority having jurisdiction for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for lighting and power.
 - .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
 - .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Safety precautions.
 - .3 Procedures to be followed in event of equipment failure.
 - .4 Other items of instruction as recommended by manufacturer of each system or item of equipment.
 - .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
 - .4 Post instructions where directed.
 - .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
 - .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

Part 2 Products

2.1 DESIGN REQUIREMENTS

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

2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Equipment to be CSA certified. Where CSA certified equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 WIRING TERMINATIONS

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

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with labels nameplates as follows:
 - .1 Nameplates: lamicoid 3 plastic laminate mm thick plastic engraving sheet melamine, matt white finish black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.
 - .2 Sizes as follows:

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

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

2.5 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.6 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment to match restoration colours.

Part 3 Execution

3.1 INSTALLATION

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

3.2 NAMEPLATES AND LABELS

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

3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fitting.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .4 Locate light switches on latch side of doors.
 - .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.5 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1400 mm.
 - .2 Wall receptacles:
 - .1 General: 300 mm.
 - .3 Panelboards: as required by Code or as indicated.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.7 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

3.8 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of electrical components including removal of conduit, junction boxes, and panels to source (home run removal) and incidentals required to complete work described in this Section.

1.2 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes , cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

1.4 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on date that tender is accepted.
- .2 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Consultant and Representative if materials suspected of containing hazardous substances are encountered and perform following activities:
 - .1 Refer to Section 01 41 00– Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in Hazardous Products Act.
 - .3 Stop work in area of suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by Representative under a separate contract or as a change to Work.

- .6 Proceed only after written instructions have been received from Consultant and Representative.

Part 2 Products

2.1 NOT USED REPAIR MATERIALS

- .1 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.

2.2 SALVAGE AND DEBRIS MATERIALS

- .1 Material Ownership: Demolished materials become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, reinstalled, or otherwise indicated to remain Representative 's property.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect work of this Section before tendering Bid; Representative will not consider claims for extras for work or materials necessary for proper execution and completion of contract that could have been determined by a site visit.

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.

3.3 EXECUTION

- .1 Removal: Coordinate requirements of this Section with information contained in Division 01 and as follows:
 - .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
 - .2 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.

- .3 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

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

Part 2 Products

2.1 TECK 90 CABLE

- .1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Conductors:
 - .1 Grounding conductor: copper aluminum as indicated ACM alloy.
 - .2 Circuit conductors: copper aluminum as indicated ACM alloy, size as indicated.
- .3 Insulation:
 - .1 Ethylene propylene rubber EP.
 - .2 Cross-linked polyethylene XLPE.
 - .3 Rating: 600 V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: galvanized steel interlocking aluminum flat.
- .6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
- .7 Fastenings:
 - .1 One hole aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables at
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
- .8 Connectors:
 - .1 Watertight, explosion-proof approved for TECK cable.

2.2 NON-METALLIC SHEATHED CABLE

- .1 Non-metallic sheathed copper cable type: NMWU. No. 12 AWG Minimum conductor size. Size to be checked for total installed length against voltage drop for code required maximum voltage drop sizing to accommodate existing feeder length to current panel. Exterior sheath to be black in colour.
- .2 Provide wood staples to secure cables where required by code. Confirm with Owners Representative for permission to staple wiring against wood structural columns and beams.
- .3 Provide product sample for field mock-up.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

- .1 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .2 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.
- .3 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF TECK90 CABLE (0 -1000 V)

- .1 Group cables wherever possible on channels.
- .2 Install cable exposed, securely supported by straps.
- .3 Do not splice cables unless indicated.

3.4 INSTALLATION OF NON-METALLIC SHEATHED CABLE

- .1 Install cables in locations generally as shown on drawings. Department representative to confirm routing to minimize exposed cables.
- .2 Install straps and box connectors to cables as required.
- .3 Do not drill new raceway holes in existing structure, re-use existing raceway for all new wiring install surface wiring suitably mechanically protected where raceways are not present.
- .4 Where holes and staples are required for cabling they must be drilled by approved trades and coordinated with Owner's Representative. All drilling requirements and planning must be requested in writing with a minimum 7 days advanced notice for all work to allow for approval of locations and methods.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 Octagon boxes for ceiling mount lights
- .3 Surface switch boxes for switches
- .4 Blank cover plates for boxes without wiring devices.
- .5 Surface/Recessed boxes for outlet boxes depending on wall finish
- .6 Provide additional boxes for field mock-up.

2.2 GALVANIZED STEEL OUTLET BOXES

- .1 One-piece electro-galvanized construction.
- .2 Single gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 Utility boxes for outlets connected to surface-mounted Devices, minimum size 102 x 54 x 48 mm.
- .4 Octagonal outlet boxes for lighting fixture outlets.
- .5 Extension and plaster rings for flush mounting devices in finished [plaster] [tile] walls.

2.3 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

- .1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.4 FITTINGS - GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.2 No.29-11, Panelboards and Enclosed Panelboards.

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 panelboards and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Include on drawings:
 - .1 Electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

Part 2 Products

2.1 PANELBOARDS

- .1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.
 - .1 Install circuit breakers in panelboards before shipment.
 - .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .2 250 V panelboards: bus and breakers rated for 10KA
- .3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .5 Lockable cover.
- .6 Two keys for each panelboard and key panelboards alike.
- .7 Copper bus with neutral of same ampere rating of mains.
- .8 Mains: suitable for bolt-on breakers.
- .9 Trim with concealed front bolts and hinges.
- .10 Trim and door finish: baked enamel.
- .11 Include grounding busbar with 3 of terminals for bonding conductor equal to breaker capacity of the panel board.

2.2 BREAKERS

- .1 Breakers: to CSA 22.2 No. 5.
- .2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .3 Bolt-on moulded case circuit breaker: quick make, break-break type for manual and automatic operation with temperature compensation for 40° C

2.3 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00- Common Work Results for Electrical.
- .2 Nameplate for each panelboard size 4 engraved.
- .3 Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for panelboards 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.

3.2 INSTALLATION

- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface mounted panelboards on plywood backboards in accordance with Section 06 10 00- Rough Carpentry. Where practical, group panelboards on common backboard.
- .3 Mount panelboards to height specified in Section 26 05 00- Common Work Results for Electrical or as indicated.
- .4 Connect loads to circuits.
- .5 Connect neutral conductors to common neutral bus.
- .6 Where panels of different systems (i.e. Standard and Vital Power) supply a common patient care area, ground busses in panels to be interconnect with a minimum #6 AWG ground conductor.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by panelboards installation.

END OF SECTION

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.2 No.42-10 , General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

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 wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.

Part 2 Products

2.1 SWITCHES

- .1 20 A, 120 V, single pole, three-way, switches to: CSA C22.2 No.55.
- .2 Manually-operated general purpose AC switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine moulding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Brown toggle.
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 Switches of one manufacturer throughout project.
- .5 Provide Switch for field mock-up.

2.2 DECORA SLID DIMMER

- .1 Contractor to verify compatibility with lamps.

2.3 RECEPTACLES

- .1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:
 - .1 Brown urea moulded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.

- .5 Triple wipe contacts and rivetted grounding contacts.
- .2 Other receptacles with ampacity and voltage as indicated.
- .3 Receptacles of one manufacturer throughout project.

2.4 COVER PLATES

- .1 Cover plates for wiring devices to: CSA C22.2 No.42.1 .
- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Plastic brown cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

2.5 SOURCE QUALITY CONTROL

- .1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
- .3 Cover plates:
 - .1 Install suitable common cover plates where wiring devices are grouped.
 - .2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
- .2 ICES-005-07, Radio Frequency Lighting Devices.
- .3 Underwriters' Laboratories of Canada (ULC)

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, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.
 - .3 Photometric data to include: VCP Table where applicable.
- .3 Product Mock-up:
 - .1 If requested by Department Representative, provide mock-up construction background on 600mm x 1200mm x 19mm PWF plywood back board, with 89mm PWF wood studs 400mm on-centre. manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide surface mounted light outlet box and light fixture.
 - .3 Provide surface mounted switch box and switch device complete with switch cover.
 - .4 Install NMWU cabling through studs from switch box to light fixture.
 - .5 Provide temporary power cord to switch to power mock-up from 120V power outlet.

Part 2 Products

2.1 LAMPS

- .1 LED lamps to be - frosted, A19, 1000 lumen with 25000 hour lamp life, LM-70 rough-service rated; or as indicated.

2.2 FINISHES

- .1 Light fixture finish and construction to meet ULC listing and CSA certification related to intended installation.

2.3 OPTICAL CONTROL DEVICES

- .1 As indicated in luminaire schedule.

2.4 LUMINAIRES

- .1 As indicated in luminaire schedule.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate and install luminaires as indicated.
- .2 Provide adequate support to suit ceiling system.

3.2 WIRING

- .1 Connect luminaires to lighting circuits:
 - .1 Install flexible or rigid conduit for luminaires as indicated.

3.3 LUMINAIRE SUPPORTS

- .1 Fixtures to be secured to underside of wood deck, confirm attachment with owner prior to starting.

3.4 LUMINAIRE ALIGNMENT

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 ASTM International
 - .1 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600kN-m/m³).
 - .2 CSA International
 - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .3 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 DEFINITIONS

- .1 “Common Excavation” means the excavation of on-site soil materials as specified in the Contract Documents and as defined herein. Common Excavation excludes topsoil and subsoil stripping and rock excavation.
- .2 “Unsuitable” or “Excess Material” means material removed to form an excavation within the Work Area that cannot be returned to the same or other excavation for use as backfill.

1.3 QUALIFICATIONS

- .1 Archaeology subcontractor: Refer to Appendix B – Statement of Work for Archaeological Mitigations.

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Basic Class II Landfill Package Soil Sampling Results
 - .1 Submit Basic Class II Landfill Package Soil Sampling Results from an accredited laboratory.
- .3 Archaeological: Refer to Appendix B – Statement of Work for Archaeological Mitigations.

1.5 MATERIALS QUALITY CONTROL AND QUALITY ASSURANCE

- .1 Quality Control:
 - .1 Contractor is responsible for all costs associated with temporary stockpiling of materials on-site.
- .2 Quality Assurance

- .1 The Departmental Representative may test soil to confirm removal of contaminated soil within the excavation of the building footprint. The confirmatory testing will be at the Departmental Representative's expense and timeline for receipt of sample results to be communicated with the Contractor.
- .2 Testing of materials will be carried out by testing laboratory designated by the Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in work.
- .3 Topsoil: uppermost part of the soil, material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding. Friable, fertile, natural loam, neither heavy clay nor of very light sandy nature containing minimum of 4% organic matter of clay loams and not less than 2% organic matter for sandy loams to a maximum of 15%, and capable of sustaining vigorous plant growth, free of rocks of 50 mm in diameter and over, subsoil contamination, roots, weeds, toxic materials, foreign objects and with an acidity range of 7.0 to 8.5; topsoil containing quackgrass, couchgrass or noxious weeds or invasive species will be rejected.
- .4 Subsoil: portion of soil material that lies immediately beneath the Topsoil extending to root depth, very little to no amount of organic soil material.
- .5 Waste material: excavated material unsuitable for use in work or surplus to requirements.
- .6 Backfill Materials: non-Topsoil materials sourced for placement of backfill within any excavations. Backfill materials shall be similar in physical composition (i.e., grain size, organics content) to the surrounding unexcavated materials and shall be approved by the Departmental Representative prior to placement. The source site of Backfill Materials shall be inspected and approved by the Departmental Representative prior to import and placement of these materials. Environmental quality testing results of the backfill material are to be provided for the designated Departmental Representative for approval prior to import to the site. Backfill Materials shall meet the following environmental quality criteria:
 - .1 Alberta Environment and Parks, Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2016).
 - .2 Granular A to OPSS SP 110F13: 50mm drainage rock.
 - .3 Road Crush: Crushed Granular 25 minus to CCDG as described in Appendix D: Geotechnical Investigation Bar U National Historic Site.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Examine geotechnical report provided as Appendix C.
 - .2 Before commencing work establish locations of buried services on and adjacent to site.
 - .3 Identify areas for soil salvage with Departmental Representative.
- .2 Evaluation and Assessment:
 - .1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.
 - .2 Testing of materials and compaction of backfill will be carried out by testing laboratory.
 - .3 Not later than 1 week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill materials proposed for use.
 - .4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.
 - .5 Before commencing work, conduct with Departmental Representative condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

3.2 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent land and roads, in accordance with requirements of authorities having jurisdiction, specific to site, to EPA 832/R-92-005 and requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Protection of in-place conditions:
 - .1 Protect excavations from freezing.
 - .2 Keep excavations clean, free of standing water, and loose soil.
 - .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
 - .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

- .5 Protect buried services that are to remain undisturbed.
- .3 Removal:
 - .1 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.
 - .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
 - .3 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within area affected by Work.
 - .4 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

3.3 EXCAVATION

- .1 Shore and brace excavations if and as required to protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.
- .2 All excavation is to be carried-out with hand-tools OR with Departmental Representative approval of Careful Shallow-Depth Machine Excavation. Careful Shallow-Depth Machine Excavation procedure listed in .5 below.
 - .1 All excavation work to be monitored by Contractor's archaeologist.
 - .2 When an item determined to be of potentially cultural significance is found, contact Departmental Representative immediately. Excavation in the immediate area to be paused until approval to proceed by Departmental Representative.
 - .3 Excavation to continue in a different area of work.
- .3 Topsoil stripping:
 - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of vegetation.
 - .3 Strip topsoil to depths as indicated by Departmental Representative. Avoid mixing topsoil with subsoil.
 - .4 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
 - .5 Stockpile in locations as directed by Departmental Representative.
 - .1 Topsoil stockpiles should be located where they will not be easily disturbed, erode, block drainage structures, or interfere with work on site.
 - .2 Topsoil that has been salvaged should be replaced only in close proximity to the location was it was removed.
 - .3 Stockpile height not to exceed 1.5 m.
 - .4 Protect stockpiles from contamination, compaction, rain and wind erosion with burlap matting as approved by Departmental Representative.

- .6 Replace topsoil as soon as possible, to prevent leaching of nutrients and loss of micro-organisms.
- .7 Disposal of unused topsoil is to be in an environmentally responsible manner as directed by Departmental Representative.
- .4 Excavate as required to carry out work, in all materials met.
 - .1 Do not disturb soil or rock below excavated surfaces. Notify Departmental Representative when excavations are complete.
 - .2 Excavations adjacent to and exterior to building stone foundations to be carried out before any stone removal occurs, as described in Historic – Dismantling Stone Masonry Section 04 03 43. Coordinate all excavation work with Parks Canada archaeology and Departmental Representative.
- .5 Careful Shallow-Depth Machine Excavation:
 - .1 Machine excavation to occur only where there is no suspected stone that will be salvaged and re-used in the construction of the foundation system.
 - .2 Smooth edged bucket of mini-excavator not to exceed 610mm wide.
 - .3 Excavation to occur so that archaeologist can observe soil being removed at all times.
 - .4 Work Excavation Plan and Communication Plan between mini-excavator operator and Contractor's archaeologist to follow Health and Safety standards and construction industry best practices.
 - .5 Contractor's archaeologist may require variance in depths of passes (lifts) depending on conditions and weather.
 - .1 Standard allowable machine work: shallow depth skimming excavation to occur at 50mm depth removal each pass (lift) until 400mm depth from adjacent grade is reached.
 - .2 Standard allowable machine work: shallow depths of 150mm depth removal each pass (lift) from 400mm to required depth..

3.4 SITE QUALITY CONTROL

- .1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.
- .2 Approval of Careful Shallow-Depth Machine Excavation will be based on successful demonstration of mini-excavator operation:
 - .1 Contractor to arrange for demonstration of Careful Shallow-Depth Machine Excavation on scheduled day approved by Departmental Representative.
 - .2 Demonstration to be video-taped and executed before Departmental Representative.
 - .3 Mini-excavator operator full-name, qualifications, safety and health certificates, and employee number to be submitted to Departmental Representative..

3.5 BACKFILLING

- .1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.
- .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: compact existing subgrade under gravel, to same compaction as specified for fill.
- .5 Placing:
 - .1 Place backfill, and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
- .6 Compaction: compact each layer of material to following densities for material to ASTM D 698:
 - .1 To underside of basecourses: 95%.
 - .2 Basecourses: 100%.
 - .3 Elsewhere: 90%.
- .7 Under seeded and sodded areas: use site excavated material to bottom of topsoil or clay layer as required.
- .8 Against foundations: excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.6 GRADING

- .1 Grade to ensure that water will drain away from buildings, walls, ramps and road areas, to areas approved by Departmental Representative. Grade to be gradual between finished spot elevations as indicated.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Dispose of cleared and grubbed material off-site daily.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4 Excavation, compaction and hauling equipment handling contaminated soils or potentially contaminated soils shall be decontaminated prior to working in non-impacted areas or prior to leaving the Site. Equipment will be satisfactorily cleaned before they depart the excavation area. At a minimum equipment components (e.g., buckets) contacting the soils will be brushed clean (i.e., to bare metal), and the sweepings contained for management as impacted soil. Where equipment may travel on contaminated soils in open excavations, tracks and tires will be scraped and brushed to remove soils, as required, before departing the construction area.

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END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent sediment and erosion control drawings.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 STRIPPING OF TOPSOIL

- .1 Ensure that procedures are conducted in accordance with applicable Provincial requirements.
- .2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .3 Handle topsoil only when it is dry and warm.
- .4 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by composting.
- .5 Strip topsoil to depths as indicated.
- .6 Pile topsoil in berms in locations as directed by Departmental Representative.
- .7 Dispose of unused topsoil off-site.
- .8 Protect stockpiles from contamination and compaction.

- .9 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

3.3 PREPARATION OF GRADE

- .1 Verify that grades are correct and notify Consultant if discrepancies occur do not begin work until instructed by Departmental Representative.
 - .1 Grade area only when soil is dry to lessen soil compaction.
 - .2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.4 PLACING OF TOPSOIL

- .1 Place topsoil only after Departmental Representative has accepted subgrade.
- .2 Spread topsoil during dry conditions in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.
- .3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .4 Cultivate soil following spreading procedures.

3.5 SUB-SOILING

- .1 Apply sub-soil, following spreading and cultivating procedures to designated areas to improve drainage and agricultural potential of soil.
- .2 Work sub-soil area following natural grade contour lines, with vibrating sub-soiler to depth of 40 cm.
- .3 Cross sub-soil the area following the first pass.
- .4 Cultivate the soil with a chain harrow to de-clod the soil.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

- .1 Excavated materials will be measured in cubic metres in their original location.
 - .1 Common excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for trench excavation as indicated.
 - .2 Width for excavation for structures as indicated.
 - .2 Rock quantities measured will be actual volume removed within following limits:
 - .1 Width for trench excavation as indicated.
 - .2 Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as indicated.
 - .3 Depth from rock surface elevations immediately prior to excavation, to elevation as indicated.
 - .4 Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.
 - .5 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
- .2 Sheet piling and bracing left in place on direction of Departmental Representative will be measured in square metres of surface area of plane surface of sheet piling.
- .3 Shoring, bracing, cofferdams, underpinning and de-watering of excavation will not be measured separately for payment.
- .4 Backfilling to authorized excavation limits will be measured in cubic metres compacted in place for each type of material specified.
- .5 Placing and spreading of topsoil will be measured for payment in cubic metres calculated from cross sections taken in area of excavation from original location.
 - .1 If double handling of topsoil is directed by Departmental Representative (stockpiling and later placing), then quantities will be measured twice; on excavation from original location and on excavation from stockpile.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698- 00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D1557- 02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).

- .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1- 88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 CSA Group (CSA)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:

- .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM C136 : Sieve sizes to CAN/CGSB-8.2.

- .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

- .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00- Quality Control :
 - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by Departmental Representative proposed dewatering and heave prevention methods as described in PART 3 of this Section.
 - .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .4 Submit to Departmental Representative written notice when bottom of excavation is reached.
 - .5 Submit to Departmental Representative inspection results report as described in PART 3 of this Section.
- .3 Preconstruction Submittals:
 - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating: location plan of relocated and abandoned services, as required clearance record from utility authority, location plan of existing utilities as found in field.
 - .3 Submit records of underground private utility locates, indicating: location plan of relocated and abandoned services, as required clearance record from private utility authority, location plan of existing utilities as found in field.
 - .4 Submit proposed routing with locations flagged on site ahead of archaeological work and clearance for excavation.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .3 Keep design and supporting data on site.

- .4 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06- Health and Safety Requirements.

1.6 EXISTING CONDITIONS

- .1 Examine soil report available from owner .
- .2 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify applicable authorities having jurisdiction. Departmental Representative establish location and state of use of buried utilities and structures.
 - .6 Confirm locations of buried utilities by careful soil hydrovac methods.
 - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
 - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative
 - .3 Ensure that excavation is undertaken in coordination with Archaeological Monitoring.
 - .4 Where required for excavation, cut roots or branches as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: to the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.

- .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.

- .3 Table:

Sieve Designation	% Passing	
Type 1	Type 2	
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

- .2 Type 3 fill: selected material from excavation or other sources, approved by Consultant for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Unshrinkable fill: proportioned and mixed to provide:
- .1 Maximum compressive strength of 0.4 MPa at 28 days.
 - .2 Maximum cement content of 25 kg/m³ with: to CSA-A3001, Type GU.
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CSA-A23.1/A23.2.
 - .5 Cement: Type GU.
 - .6 Slump: 160 to 200 mm.
- .4 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

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

3.3 PREPARATION/PROTECTION

- .1 Keep excavations clean, free of standing water, and loose soil.
- .2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.
- .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .4 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of grasses and removed from site.
- .2 Strip Topsoil to depths as indicated.
- .3 Stockpile in locations as directed by Departmental Representative.
 - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site.

3.5 STOCKPILING

- .1 Stockpile fill materials in areas designated by Departmental Representative.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.

3.7 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Ensure that excavation is undertaken in coordination with Archaeological Monitoring. Work to be stopped and started as directed by Departmental Representative to address Archaeological finds.
- .3 Excavate to lines, grades, elevations and dimensions as indicated.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.

- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of surplus and unsuitable excavated material off site.
- .8 Do not obstruct flow of surface drainage or natural watercourses.
- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify Departmental Representative when bottom of excavation is reached.
- .11 Obtain Departmental Representative approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .13 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with fill concrete. Type 2 fill compacted to not less than 100 % of corrected Standard Proctor maximum dry density
- .14 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.8 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698, ASTM D1557.
 - .1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95 % of corrected maximum dry density.
 - .2 Place unshrinkable fill in areas as indicated.

3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated.
- .2 Place bedding and surround material in unfrozen condition.

3.10 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.

- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to [grades indicated] . Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 72 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .6 Place recycled fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage system in backfill as indicated.

3.11 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris. Trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as indicated.
- .3 Reinstall lawns to elevation which existed before excavation.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Sub-surface investigation report: when site conditions differ from those indicated, submit written notification from piling engineer to Departmental Representative and await further instructions.
- .4 Helical Piles: Submit Engineered plan and design details complete with signature and stamp of qualified professional engineer registered or licensed in Alberta and experienced in the design of helical piles. Details to include schedule of planned sequence of driving to Departmental Representative for review, as specified. Details on Tender Drawings are schematic representations of helical pile installation only. Engineered Plan and design details to suit Contractor's plan for lifting and/or moving of barn structure. Review Geotechnical Report and design loads and grade beam configurations on structural drawings for basis of pile design.
 - .1 Shop drawings showing profiles and product components, including helix and accessories. Provide the following information: each helical pile location, helical piles shaft diameter and length, helix diameter, installation angle below the horizontal (as required) and the extension in the axis of the shaft length; the final installation torque on all helical piles and the final torque
 - .2 Provide a CCMC Evaluation Report that demonstrates compliance of the Helical Pile product with the current National Building Code.
- .5 Equipment:
 - .1 Prior to pile installation submit for review by Departmental Representative, list and details of methods and equipment for use in installation of piles. Include methods and equipment to suit clearance from lifting and/or moving of Barn Structure, and methods of protection of existing structure from damage during pile installation.
 - .2 Non-impact methods; submit characteristics to evaluate performance.
- .6 Submit driveability analysis as specified, to Departmental Representative for approval of torque driver.
- .7 Quality assurance submittals:
 - .1 Test reports: submit 3 copies of certified test reports for piles from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 The installers must be trained and certified by the helical pile manufacturer experienced and specialized in the installation of similar structures to those

required for this project. For each installer who will work on the jobsite, provide a certificate or a card showing that the installer is trained and certified by the pile manufacturer.

- .4 Provide a manufacturer's certificate confirming that the manufacturer has a quality control system. This document must confirm the quality of raw materials (central shaft and steel helix) by metallurgical certificates and quality control tests of the welds.

- \ .8 Galvanic Protection System for Helical Piles: Submit drawings, which include typical galvanic corrosion protection system installation details, layout for anode and type for each Helical Pile. All shop drawings submitted shall be signed and sealed by a professional engineer licensed and certified as a Cathodic Protection Specialist by NACE International. anode manufacturer.

- .1 The Contractor shall enlist and pay for the services of a NACE-qualified corrosion technician supplied by the galvanic anode manufacturer to provide training and on-site technical assistance during the installation of the galvanic column protection system.
The Contractor shall coordinate the work with the designated corrosion technician to allow for site support during project start-up and initial anode installation.

1.2 DELIVERY, STORAGE AND HANDLING

- .4 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's instructions.
- .5 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
- .6 Replace damaged piles as directed by Departmental Representative.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused, or cut off steel materials from landfill to local facility as approved by Departmental Representative.

1.4 EXISTING CONDITIONS

- .1 Sub-surface investigation report is bound into specification in the Appendix.
- .2 Notify Departmental Representative in writing by the piling engineer if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.
- .3 The Barn structure is a Classified Heritage Structure and must be protected from damage during Pile Installation.

1.5 SCHEDULING

- .1 Drive piles in accordance with sequence indicated in the reviewed Engineered piling plan as submitted.
- .2 Provide schedule of planned sequence of driving to Departmental Representative for review, not less than two weeks prior to commencement of pile driving.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Helical Piles:
 - .1 The piles and components must be fabricated with steel conforming to ASTM A 500 Grade C and/or CAN/CSA G40.21.
 - .2 Hot dip galvanization coating conforming to ASTM A-123-13 OR an approved anode protection system (sacrificial).
Splice piles only with written approval of Departmental Representative and the piling engineer's design.
 - .3 Design details of splice to bear dated signature stamp of professional engineer registered or licensed in Canada.
 - .4 Zinc Anode Distributed Galvanic Zinc Anode units (DAS).
Galvanic Zinc Anode units (DAS) shall be protected from rain and water.

2.2 EQUIPMENT

- .1 Torque Driver: provide manufacturer's name, type, rated torque at normal working rate.
- .2 Non-impact methods of installation such as torqueing or other means: provide full details of characteristics necessary to evaluate performance.

PART 3 EXECUTION

3.1 PREPERATION

- .1 Protection:
 - .1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.
 - .2 Arrange sequencing of pile driving operations and methods to prevent damage to existing structures.
- .2 Ensure that ground conditions at pile locations are adequate to support pile driving operation and load testing operation.
 - .1 Make provision for access and support of piling equipment during performance of Work.
- .3 Drive piles only when excavation has been completed.

- .4 Pre-boring of holes may be acceptable to facilitate pile alignment control.

3.2 INSTALLATION

- .1 Design load capacity of pile at specified load is noted in kilo-Newtons (kN) as indicated.
- .2 Installation of each pile will be subject to review of Departmental Representative.
 - .1 Departmental Representative will be sole judge of acceptability of each pile with respect to depth of penetration, alignment, position or other criteria used to determine load capacity.
 - .2 Allow for Departmental Representative to review final driving of all piles prior to removal of pile driving rig from site.
- .3 Drive each pile to final depth as required to achieve design capacity and as confirmed by pile design engineer.
 - .1 Determine required driving resistance from load test on a test pile as directed by Departmental Representative and pile design engineer.
 - .2 If load test is not carried out, determine required final driving resistance using formula approved by pile design engineer.
- .4 Drive each pile to pile tip elevation as required by design criteria in order to achieve design loads stipulated.

3.3 APPLICATION / DRIVING

- .1 Use driving techniques and equipment to protect piles from damage.
 - .1 Piles may be driven with pile cap plate installed prior to driving.
 - .2 Reinforce pile heads as may be required.
 - .3 Damaged piles as determined by Departmental Representative will be rejected.
- .2 Hold piles securely and accurately in position while driving.
- .3 Deliver driving torque along axis of pile.
- .4 Remove loose and displaced material from around piles after completion of driving, and leave clean, solid surfaces to receive foundation concrete.
- .5 Cut off piles neatly and squarely at elevations as indicated to tolerance of plus or minus 25 mm.
 - .1 Provide sufficient length above cut-off elevation so that any portions damaged during driving may be cut off.
- .6 Remove cut-off lengths from site on completion of work.

3.4 DRIVING TOLERANCES

- .1 Pile heads to be within 40 mm of locations as indicated.
- .2 Piles shall not be more than 2% of length out of vertical alignment.

3.5 OBSTRUCTIONS

- .1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, remove obstruction and proceed as directed by Departmental Representative and pile design engineer.

3.6 REJECTED PILES

- .1 Pull out rejected piles and replace with new piles.
- .2 Remove rejected pile and replace with new, and if necessary, longer pile.
- .3 Remove rejected pile and fill hole as directed by Departmental Representative and pile design engineer.
- .4 Leave rejected pile in place and cut off as directed by Departmental Representative and pile design engineer.
- .5 Leave rejected pile in place, place adjacent pile and modify pile cap as directed by Departmental Representative and pile design engineer.
- .6 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

3.7 FIELD QUALITY CONTROL

- .1 Pile Driving Torque Monitor:
 - .1 Use continuous pile driving torque monitoring and data logging system to determine and confirm driving criteria such as required driving torque and penetration resistance relative to design load on a minimum of 3 piles during start of pile placement.
 - .1 Confirm criteria during pile installation by using pile driving torque monitoring on 3 additional piles when requested by Departmental Representative.
 - .2 Work to be performed by professional engineer experienced in the work registered or licensed in the Province of Alberta.
- .2 Measurement:
 - .1 Maintain accurate records of driving for each pile, including:
 - .1 Type and make of pile torque driving machine and pile driving torque monitoring and data logging system.
 - .2 Pile size, length, number of screw flights including depth below grade, and location of pile.
 - .3 Torque monitoring data for entire length of pile including speed of rotation and magnitude of torque.
 - .4 Final tip and cut-off elevations.
 - .5 Other pertinent information such as interruption of continuous driving, pile damage.
 - .2 All measurements, observations and calculations associated with pile driving torque monitoring and data.
 - .3 Provide Departmental Representative with three copies of records.

3.8 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 W47.1-09 (R2014) - Certification of Companies for Fusion Welding of Steel.
 - .2 W48-14 - Filler Metals and Allied Materials for Metal Arc Welding.
 - .3 W59-13 - Welded Steel Construction (Metal Arc Welding).
 - .4 CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with requirements of Section 31 61 13.
- .3 and indicate: splice detail, pile cap, tip reinforcement.
- .4 Quality Assurance:
 - .1 Test Reports: submit 3 copies of mill test reports indicating yield and chemical analysis of steel piles if requested by Departmental Representative.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Submit pile driving records, as described in PART 3 - RECORDS, for review by Departmental Representative.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .3 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
- .4 Unused paint and coating materials must not be disposed of into sewer system, into streams, lakes, onto ground or in any other location where it will pose a health or environmental hazard.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Steel Helical piles: as specified in Section 31 61 13.
- .2 Welding materials: to CSA W48.

- .3 Steel plates: to CSA-G40.20/G40.21, Grade 300W
- .4 Exterior protective coating: coal tar epoxy to CAN/CGSB-1.184, inorganic zinc to CAN/CGSB-1.171M, as specified by piling contractor's engineer.

PART 3 EXECUTION

3.1 PAINTING AND COATING

- .1 Painting requirements include surface preparation of outer surfaces of piling including bearing plate pile cap by grit blasting, application of inorganic zinc coating and coal tar epoxy coatings and touch-up after delivery.
- .2 Do not paint portions of pile, which are to be encased in concrete.
- .3 Surface preparation:
 - .1 In accordance with SSPC-SP.
 - .2 Apply first coating of paint same day as sand or grit blasting.
 - .3 Remove oil, grease, organic matter, with solvents or detergents prior to painting in accordance with paint manufacturer's recommendations.
- .4 Paint from 600 mm below finished ground elevation to top of pile.
- .5 Application:
 - .1 Apply two coatings, each in accordance with manufacturer's recommendations.
 - .2 First coat: inorganic zinc applied to average 75 micrometres dry-film thickness and minimum 65 micrometres thickness.
 - .3 Second coating: coal tar epoxy to average single coat dry-film thickness of 180 micrometres.
 - .4 Coatings to be free from sags and runs.

3.2 INSTALLATION

- .1 Install piling in accordance with Section 31 61 13 - Pile Foundations, General Requirements.
- .2 Splice pile extensions, to details as indicated on reviewed shop drawings.
 - .1 Align extension with driven pile when splicing.
 - .2 Provide full bearing of spliced parts.
- .3 Cut off piles squarely at required elevation.
- .4 Touch up scratches on uncoated surfaces with two applications of coal tar epoxy, before and after driving.

3.3 WELDING

- .1 Weld to CSA W59.
- .2 Welding certification of companies: to CSA W47.1.

3.4 RECORDS

- .1 Keep complete and accurate record of each pile driven.
- .2 Indicate:
 - .1 Pile number and location.
 - .2 Design load
 - .3 Type and size of shaft
 - .4 Helical configuration, spacing and diameter of helical plates
 - .5 Minimum effective installation torque.
 - .6 Ground elevation.
 - .7 Tip elevation.
 - .8 Cutoff elevation to top of cap plate.
 - .9 Torque installation records.
 - .10 Installation data including: rate of installation.
 - .11 Unusual pile behavior or circumstances experienced during driving such as re-driving, weaving, obstructions, and unanticipated interruptions.

3.5 CLEANING

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

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

- .1 Preparation of sub-grade for placing of topsoil.

1.2 REFERENCE STANDARDS

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

Part 2 Products

2.1 TOPSOIL

- .1 Topsoil for seeded areas : mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
 - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
 - .2 Contain no toxic elements or growth inhibiting materials.
 - .3 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - .4 Consistence: friable when moist.

2.2 SOIL AMENDMENTS

- .1 Fertilizer:
 - .1 Fertility: major soil nutrients present in following amounts:
 - .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 - .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
 - .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
 - .5 Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .6 Ph value: 6.5 to 8.0.
- .2 Peatmoss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5 mm.

- .3 Sand: washed coarse silica sand, medium to coarse textured.
- .4 Organic matter: compost Category A, B in accordance with CCME PN1340 ,
unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust,
meeting the organic matter, stability and contaminant requirements.
- .5 Use composts meeting Category B requirements for land fill reclamation and large scale
industrial applications.
- .6 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm
sieve, 50% passing 0.125 mm sieve.
- .7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous,
potassium and other micro-nutrients suitable to specific plant species or application or
defined by soil test.

2.3 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient
lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion
and discharge of soil-bearing water runoff or airborne dust to adjacent properties and
walkways, according to sediment and erosion control plan, that complies with EPA
832/R-92-005 or requirements of authorities having jurisdiction, whichever is more
stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during
construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed
during removal.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil [as indicated] to following minimum depths after settlement.
 - .1 150 mm for seeded areas.
 - .2 135 mm for sodded areas.

- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 SOIL AMENDMENTS

- .1 For turf: apply and thoroughly mix soil amendments into top 50 mm of existing soil.

3.4 FINISH GRADING

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
 - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
 - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Waterton Lakes National Park General Project Best Management Practices, Version 1.3, Parks Canada (May 2014)

1.3 MEASUREMENT AND PAYMENT

- .1 Payment for seeding will be made at unit price bid per square metre of actual surface measurements verified by the Departmental Representative. Areas of blending into existing grass will not be measured for payment.
- .2 Area indicated in Unit Price Table is for work associated with minor grading and excavation work only. All other seeding resulting from rehabilitation and restoration of other areas of the site due to the Contractor's machinery and use of the site is considered an incidental cost and shall be included in the lump sum amount of the cost of the work to execute the Contract.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.
- .2 Scheduling:
 - .1 Schedule seeding to coincide with preparation of soil surface.
 - .2 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.

1.5 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 seed, and fertilizer (if required).
 - .2 Submit two [2] copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, 01 35 43 - Environmental Procedures.
- .3 Certificates: certificate of seed analysis to be provided to the Departmental Representative. Certificates of Analysis must: include both the common and scientific name following the CANADENSYS nomenclature system; indicate if the seed is a cultivar, ecovar, or wild native; geographic origin (seed source); date of collection; method of seed storage; germination, viability and vigour; and indicate all other species occurring including agronomic, weed, and native species; and date of the analysis. The contact information for the Seed Supplier will be included.
- .4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Landscape Contractor: to be a Member in Good Standing of the Alberta Horticultural Trades Association

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

1.8 WARRANTY

- .1 For seeding, 12 month warranty period is extended to one (1) full growing season.

2 Products

2.1 SEED MIX

- .1 Canada "Certified" seed, "Canada No. [1] [2] Ground Cover Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".

- .1 In accordance with Parks Canada Waterton Lakes National Park General Project Best Management Practices Version 1.3, seed mixture is as follows:

Mixture composition:

- .1 40% Foothills rough fescue *Festuca campestris*
 - .2 20% Idaho fescue *Festuca idahoensis*
 - .3 10% Slender/awned wheatgrass *Agropyron trachycaulum/subsecundum*
 - .4 10% Northern wheatgrass *Festuca campestris*
 - .5 10% Western wheatgrass *Pascopyrum smithii*
 - .6 5% June grass *Koeleria macrantha*
 - .7 5% Alkaline bluegrass *Poa juncifolia*

- .2 In packages individually labelled in accordance with "Seeds Regulations" and indicating weight, analysis and name of the supplier.

2.2 WATER

- .1 Free of impurities that would inhibit germination and growth.
- .2 Supplied by Departmental Representative at designated source.

3 Execution

3.1 EXAMINATION

- .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 SEED BED PREPARATION

- .1 Do not perform work under adverse field conditions as determined by Departmental Representative.
- .2 Remove and dispose of: weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Verify that grades are as per drawing. If discrepancies occur, notify Departmental Representative] and commence work when instructed by Departmental Representative.
- .4 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated to tolerance of plus or minus [15] mm, surface draining naturally.
- .5 Cultivate fine graded surface approved by Departmental Representative to 25 mm depth immediately prior to seeding.

3.3 SEED PLACEMENT

- .1 Ensure seed is placed under supervision of Department Representative.
- .2 Apply only during calm weather and assure that enough moisture is available to ensure germination and growth.
- .3 For manual seeding:
 - .1 Use manually operated drop seeder ("Cyclone" type or equivalent).
 - .2 Use equipment and method acceptable to Departmental Representative.
 - .3 Blend applications 150 mm into adjacent grass areas to form uniform surfaces.
 - .4 Sow half of required amount of seed in one direction and remain at right angles as applicable.
 - .5 Incorporate seed by light raking in cross directions.

Rake over soil by hand to assure seed is covered by soil.

3.4 CLEANING

.1 Equipment to be clean on arrival to site.

- .1 All equipment and vehicles will be made available for inspection by the Departmental Representative on arrival to site. 48 hours' notice is required for equipment inspection with the Departmental Representative. Water trucks require a written restricted activity permit from the Departmental Representative to enter the site. The permit is received at initial inspection.
- .2 Machinery must arrive on site in a clean and dry condition and be maintained free of fluid leaks, vegetative material (i.e., invasive species, noxious weeds) and soils from off-site. All construction equipment from outside the site will be washed prior to arrival to minimize the risk of introducing weeds or aquatic invasive species. Additional weed-cleaning stations may be designated by the Departmental Representative depending on project activities and locations (see table below).

Are additional weed cleaning stations required?	Required	Location (s)	Notes

- .3 Inspect equipment daily for fluid/fuel leaks and maintain equipment in good working order.
- .4 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .5 Leave Work area clean at end of each day.
 - .6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .7 Clean and reinstate areas affected by Work.
 - .8 Waste Management: separate waste materials for re-use and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .9 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Erect 'jack leg' barrier fencing around newly seeded areas sufficient to protect against deterioration due to pedestrian or other traffic with approval from the Departmental Representative.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of seed application until acceptance by the Departmental Representative:
 - .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
 - .2 Repair and re-seed dead or bare spots to allow establishment of seed prior to acceptance.
 - .3 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices with approval from Departmental Representative.

3.7 FINAL ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental Representative provided that:
 - .1 The seed has properly established itself;
 - .2 Seeded area is free of bare and dead spots;
 - .3 Seeded area is without weeds; and
 - .4 No surface soil is to be visible when material is at height of 100 mm.
- .2 Seeded areas will be accepted the following spring one month before the start of the growing season.

END OF SECTION

APPENDIX A

BIA

APPENDIX B

Statement of Work for Archaeological Mitigations

STATEMENT OF WORK Bar U National Historic Site of Canada Workhorse Barn (Building 17) and Bunkhouse #3 (Building 30) Rehabilitation Archaeological Mitigations

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1. Parks Canada Mandate:

On behalf of the people of Canada, we protect and present nationally significant examples of Canada's natural and cultural heritage, and foster public understanding, appreciation and enjoyment in ways that ensure their ecological and commemorative integrity for present and future generations.

2. Objective:

To acquire archaeological services from a professional archaeological consultant (the consultant) to carry out:

- An archaeological monitoring of the Workhorse Barn (Building 17) that will be impacted as a result of proposed plans to construct a new concrete foundation and landscaping work to control drainage around the building perimeter at Bar U National Historic Site of Canada.
- An archaeological mitigation and monitoring of the associated temporary barn location. This will be the location of a temporary barn structure while the original barn is renovated.

3. Background: Bar U Ranch NHS

The Bar U Ranch is the only national historic site commemorating the history and importance of ranching in Canada. Established in 1882, the Bar U Ranch is one of the first and most enduring large corporate ranches in western Canada. The ranch was the linchpin of a business empire which included a number of ranches in the short grass prairie including farms, meat packing factories, and flour mills. The site encloses several historic buildings and structures (cookhouse, blacksmith shop, harness shop, etc.) illustrating various stages of ranching development from 1882 to 1950. It was acquired by Parks Canada in 1991 and received the status of National Historic Site on December 31, 1991. The designation includes the original ranch headquarters situated along Pekisko Creek – consisting of 35 historic structures – and the visitor orientation centre.

3.1 Workhorse Barn (Building 17)

The Workhorse Barn located on the south side of the Pekisko Creek in the main area of the ranch, is one of the 35 historic structures within the Bar U Ranch complex. It was likely constructed between 1896 or 1897 to replace an earlier sod-roofed barn. It was constructed of substantial logs with a high sloping roof to accommodate a hay loft. These walls were placed on a foundation of sandstone flagstones (Heitzmann 1993: 26). In about 1909 or 1910 a shed roofed addition was placed onto the barn on its west side. Significant modifications were made to the front of the barn in the 1950s where rotting logs were replaced by a concrete faux log facade (Heitzmann and Jamieson 1998: 11).

3.2 Archaeological Assessment: Workhorse Barn

There have been two previous archaeological investigations of the Workhorse Barn (Heitzmann and Jamieson 1998: 11 and AMEC Foster Wheeler 2018). These investigations have informed an Archaeological Overview Assessment undertaken by Hill (2017) that determined that there is a

STATEMENT OF WORK Bar U National Historic Site of Canada Workhorse Barn (Building 17) and Bunkhouse #3 (Building 30) Rehabilitation Archaeological Mitigations

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high potential for the proposed foundation rehabilitation work to impact buried heritage resources. Therefore the archaeological requirements in this document will only be subject to modification if first approved by the Parks Canada Terrestrial Archaeologist.

The archaeological overview assessment (Hill 2017) determined that there is a requirement for an archaeological mitigation by controlled excavation (conducted by Amec Foster Wheeler in 2018). Monitoring will be required during the construction phase of this project on activities resulting in ground disturbance for the placement of the new building foundations. This is due to the nature of the construction project to impact on buried heritage resources, the historic context of Building 17, its Level 1 NHS status and the recommendations from the 1995 and 2018 archaeological field reports. The contractor will coordinate with the Bar U NHS site managers for actual scheduling of the archaeological work.

4. Scope of Work

All archaeological work undertaken by the consultant including field and laboratory work must conform to and abide by the standards and practices of Parks Canada.

4.1 Archaeological Mitigation:

4.1.1 Workhorse Barn (Building 17)

The following archaeological monitoring is required for the proposed construction activities relating to the Workhorse Barn building:

1. Landscaping excavation on the exterior of the building
 - a. Archaeological monitoring is required of all ground disturbance outside of the building.
2. Lifting of the building off its current foundations and sliding to one side. This will provide good access to the ground under the structure and safer access for monitoring crews.
 - a. If the beams used to lift the building are at or below ground level so as to cause ground disturbance, archaeological monitoring will be required. Any similar impacts to the soils outside the building will need archaeological monitoring.

If project scheduling puts the project-related construction within a frozen ground situation, the “winter excavation” requirements outlined below will be necessary (see Sec. 4.2 below and Appendix 1).

If the beams used to lift the building and sliding off to one side are not at ground level and do not cause ground disturbance inside the building, no archaeological concerns are noted.

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If associated temporary footings, supports etc. that are used to support apparatus related to raising and moving the building have the potential to impact subsurface soils, archaeological monitoring will be required.

3. Foundation trenching

a. Foundation trenching by a narrow bucket mini excavator is proposed to replace the existing sandstone cobble foundation supports. Past archaeological testing around the existing structure has indicated that the presence of sandstone cobbles and the occasional historic artifacts exist within the top 20 cm of soil. It is required, therefore, that archaeological monitoring be conducted during the removal and digging of the new foundation trench. The archaeological monitor will be responsible for detailed recording of the current foundation structures (cobbles and whatever other structural and artifactual material is encountered) at a resolution of 1cm and will have the authority to direct the mini excavator operator as to how this top layer is dug to facilitate appropriate professional recording of encountered archaeological remains.

b. It is essential that while excavating the foundation trench by mini excavator that care be taken to minimise impact to the intact archaeological layers within the building. If the construction trench extends into the interior of the building beyond the sill plate of the building walls, efforts are to be made to widen the trench to the outside of the building to avoid impacts to the interior archaeological layers.

4 Temporary Barn archaeological mitigation

A temporary barn structure will be set up north of the main bridge over Pekisko Creek in the vicinity of (north of) the round up camp. This portion of the project will involve:

1. The erection of a fabric covered steel frame structure with portable metal livestock panels to create stall space inside.
2. The structure would need to be staked or moored to the ground and the panels would have to be secured with either posts or stakes.
3. Horses in and out of the temporary structure and especially in the stall areas may add a trampling disturbance.
4. Size and exact location of the structure can be obtained through the construction project manager contact listed later in this document.

Archaeological assessment is required of the temporary barn location. At a minimum, limited shovel testing (maximum n=5) and surface reconnaissance will be required once the structure footprint is determined. Shovel testing may be expanded depending on nature and significance of testing results with agreement from Terrestrial Archaeology Parks Canada project manager.

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Archaeological monitoring of construction is not required unless testing results indicate it is necessary.

4.2 Winter Archaeology testing and monitoring Requirements.

If frozen soils are encountered, the most appropriate method to follow under such conditions will be developed in consultation with Terrestrial Archaeology and Parks Canada project managers, construction contractor and the principal investigator (archaeological consultant). This joint consultation will be required and initiated by the principal investigator. Under the heading: *Frozen Ground Methods* (Appendix I) three possible methods (A, B, C) that may be employed for monitoring or archaeological artifact/feature recording and evaluation are described. B and C are the most acceptable options. Option A, the removal and subsequent thawing of frozen matrix should only be considered if all other approaches prove to be unproductive and inefficient.

4.3 Documentation of excavations

The consultant must use the Parks Canada provenience system and conform at a minimum to the documentation standards outlined in *Parks Canada Recording Manual: Excavation and Surveys* (http://www.pc.gc.ca/apps/rps/page1_e.asp).

- All finds must be mapped and geo-referenced within 1cm accuracy; especially structural features. *As found maps may be used by construction designers and architects to help rebuild structural elements so that accuracy to 1cm resolution is important. In addition, there may be a requirement for project managers to have the mapping information very soon after the mapping is complete to aid in determining future project design decisions. The mapping strategy developed by the contractor will need to keep this in mind- there may be a quick turnaround time for the use of this information within the overall project.*
- The stratigraphy of all units must be documented with written descriptions and photographs. Information collected should include, but not necessarily be limited to, inclusions, colour, etc.
- Significant features and/or artifacts must be documented, photographed and mapped in situ whenever possible.
- Each location where archaeological monitoring and evaluation occurs must be photographed prior to, and after testing.

The Consultant will provide daily briefings or as appropriate to the Project Managers outlining the state of the investigations and archaeological findings during the project as well as any changes in scope, developments or issues.

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4.4 Prior to commencement of field work

The consultant must submit an on-line application

(http://www.pc.gc.ca/apps/rps/page1_e.asp) for a Parks Canada Research and Collection Permit. As the primary permit holder, the principal investigator, representing the consultant, and the consultant are responsible for all responsibilities identified in the general conditions and any special conditions identified within the permit.

The consultant must meet once with the Project Manager and other Parks Canada staff (including a terrestrial archaeology representative) as appropriate to ensure the project requirements are understood, identify any issues and establish a communication protocol for the duration of the project.

The consultant must review the archaeological background material provided to them by Parks Canada to facilitate a working knowledge of the site and the identification of archaeological resources encountered during the investigations.

4.5 Documentation Requirements

The consultant must record to professional archaeological standards all archaeological resources of heritage value including but not limited to field notes, elevations, maps and photographs according to Parks Canada's standards. At a minimum the Consultant must abide by the requirements of *Parks Canada Recording Manual: Excavation and Surveys* (http://www.pc.gc.ca/apps/rps/page1_e.asp). (Artifact processing and cataloguing requirements are set out in Section 5.3 and in Appendix III.)

Site number and other relevant Parks Canada provenience information will be provided to the consultant by Parks Canada Terrestrial Archaeology at the beginning of the contract with start numbers and instructions on their use in cataloguing artifacts, maps, drawings, field notes, photographs, etc.

The consultant must validate with Parks Canada Terrestrial Archaeology how they will use the Parks Canada provenience with the exact numbers they will use (i.e., operations, suboperations, lots, artifact catalogues, cataloging photographs, maps etc.). All errors that do not respect the provenience system and start numbers provided must be corrected by the consultant at their cost.

Each location where archaeological work occurs must be photographed prior to and after excavation/evaluation. Photographs must be digital in jpg or tiff format and in high resolution to support 8x10", 300dpi or equivalent.

Mapping information including shovel test and excavation unit locations must be mapped to 1cm accuracy and must be provided as ESRI ArcGIS shapefiles or other previously agreed upon format.

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5. Deliverables

All deliverables must be submitted and approved prior to final payment and closing of the contract.

5.1 Communication

The consultant will keep both the Terrestrial Archaeology project manager and the Parks Canada construction project manager informed of the progress of the investigations as agreed to by the parties.

Where the consultant can implement immediate mitigation measure(s) on archaeological resources of heritage value, this must be communicated in writing to the Parks Canada project manager. Approval must be provided by the Parks Canada project manager, based on advice of the Parks Canada Terrestrial Archaeology Section, prior to the consultant implementing the mitigation measure(s).

5.2 Reporting

Letter of Clearance

Unless otherwise agreed to in writing, within fourteen (14) days after completion of the pre-impact field work portion of the project the consultant must provide a letter to the Parks Canada project manager indicating any locations that may require further archaeological mitigation measures, and list the those locations that are cleared of any archaeological concerns either because no archaeological resources of heritage value were encountered or where mitigation measure have already been implemented, thereby clearing the locations for development to proceed. This letter will serve as the preliminary or interim archaeological report.

Final Report

Following the completion of the project the Consultant must produce a final report, to be submitted within ninety (90) days after the completion of the project. The report at a minimum must include:

- Introduction: stating the scope of the archaeological work undertaken.
- Historical Background: outlining the temporal phases of occupation for the study area.
- Method: describing documentary, field, laboratory, and analytical methods employed.
- Results: detailing the archaeological resources identified, including interpretation and analysis of the archaeological resources encountered in the study area.

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- Interpretation: of stratigraphic sequence and temporal phasing for the archaeological deposits encountered as applicable to the project and associated discipline of archaeology.
- Interpretation: description of artifacts and archaeological resources collected in the field.
- Conclusions: what archaeological and/or cultural resources are present, the significance to be inferred from their presence and their locations.
- Mitigation measures: indicate if additional investigations required, monitoring or recording required to preserve sufficient record of the archaeological resources.

The final report for the archaeological work is to be signed and submitted by the Principal Investigator, who was granted the Parks Canada Research and Collection Permit. The Final report will be reviewed and approved by Parks Canada.

One bound original of all final reports and one unbound, single-sided original of each final report, suitable for reproduction and distribution, will be submitted to the Parks Canada Terrestrial Archaeology. Two (2) bound originals will be submitted to Parks Canada Agency, Waterton Lakes National Park / Bar U Ranch National Historic Site (contact Terrestrial Archaeology project manager for submission details).

One (1), two page summary, of the project and significant results, which could include the cool or culturally important finds in plain jargon-free English, suitable for public presentation. In addition, a selection of a dozen high quality annotated digital images illustrating the project and field work will accompany this summary, also suitable for public presentations.

Unless otherwise specified, all final reports, including embedded images and tables, will also be submitted on a DVD-ROM or hard drive and must be:

- Attached to each paper copy report;
- Free of computer viruses;
- Formatted and accurately matched to the paper versions. Electronic versions that do not accurately match the paper versions will be rejected, and correction at no extra cost will be required;
- Submitted in Adobe Acrobat format (pdf);
- When creating the Adobe Acrobat format (pdf), ensure that all fonts required by the document are embedded;

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- Submit in high resolution;
- It is acceptable to submit the various sections of the report as appropriately labelled and organized separate files. However, a single, consolidated file must also be submitted;
- Compatible with standard Microsoft Windows fonts;
- Clearly labeled, including title, permit number, project name, site number, consultant group name, and the date;
- Provide a directory key or legend for the DVD-ROM both in the packaging and in an electronic file on the DVD-ROM itself;
- Organize/label the DVD-ROM files in a logical, user-friendly fashion; Test the DVD-ROM before submission.

5.3 Artifacts

All artifacts will be washed, bagged, and catalogued according to provenience, specifically by lot number. Artifacts recovered will be assessed and appropriate conservation methods adopted in the field to deter any deterioration of the artifact. The consultant will provide a detailed inventory of all artifacts recovered from all investigations. The inventory will include: provenience, object, function, material, diagnostic attributes, and #of pieces. The format for submission of database information and mapping will be determined by the Department Representative for Parks Canada.

All artifacts and artifact catalogues are to be provided in both paper and electronic (MS Excel) format and delivered to Parks Canada Terrestrial Archaeology within thirty (30) days (within five (5) days, if damp or wet) of the completion of final report. Artifacts are to be processed, inventoried and packaged using archival quality materials and according to the standards of Parks Canada. Artifacts recovered from the field are subject to the *Management Directive 2.1.22 Collection Management System: Conservation Services, Guidelines for Archaeological Field Conservation* (Parks Canada 1991). (See also: Appendix III: **Collections Management Procedures**) .

The Consultant will correspond with Parks Canada in order to obtain any required provenience information and for information regarding starting numbers for cataloguing artifacts, maps and photographs.

5.4 Field Records

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A copy of all original records (i.e., field notes, drawings, artifact and photograph catalogues, completed site forms, raw GPS data set(s)) are to be delivered to the Parks Canada Terrestrial Archaeology within thirty (30) days of the completion of the final report.

A digital photo catalogue. All photographs within the AIA must be digital in JPEG or tiff format and in high resolution to support 600dpi or equivalent.

Digital spatial data. The spatial data set(s) showing the locations of all sites, all shovel tests (positive and negative), identified features, and a track log for all survey and assessment activities, including both points and polygons, as ESRI ArcGIS shapefiles or other previously agreed upon format.

5.5 Maps

Maps will be included in the final report. The Consultant will provide the collected mapping data set(s) in ESRI ArchInfo GIS format or a format compatible with ESRI ArchInfo GIS or other previously agreed to format to Parks Canada within thirty (30) days of completion of the final report. Resolution must be to 1cm as the mapping information may be used for architectural or rebuilding purposes.

6. Parks Canada's responsibilities

Parks Canada will provide the consultant with access to the relevant documents for the project and to records of previous archaeology carried out at Grasslands NP prior to the commencement of field work.

7. Consultant's Responsibilities

Archaeological Mitigation: General

Execute the scope of work and provide the deliverables described above.

All investigations and analyses must comply with the *Standards and Guidelines for the Conservation of Historic Places in Canada*, and more specifically *Parks Canada Guidelines for the Management of Archaeological Resources* and the *Parks Canada Cultural Resource Management Policy*.

Decisions made by the consultant will be consistent with professional standards and guidelines. Human remains are not considered archaeological resources. Should human remains be encountered, all activities must be halted and the Departmental Representative and Field Unit Superintendent must be notified. The archaeologist must await further direction from the Departmental Representative and/ or Field Unit Superintendent.

All cemeteries, burial grounds, human remains, funerary objects, and grave markers found in the project area are subject to the *Management Directive 2.3.1: Human Remains, Cemeteries*

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and Burial Grounds (Parks Canada 2000). The directive applies to all human remains, and their associated sites and material culture, Aboriginal and non-Aboriginal alike.

All archaeological data and artifacts collected in the field are the property of the Crown. The artifacts and records are considered to be on loan to the consultant until the archaeological work and final archaeological report are completed, in accordance with the allotted time period specified in the contract. The consultant is legally responsible for all field data, artifacts, etc. while in the care of the consultant. Electronic data (maps, artifact catalogues, digital photo catalogues etc.) must be submitted in the format specified by Parks Canada. It is the consultant's responsibility to ensure that all data is submitted in the proper format.

The consultant will be made aware that Parks Canada Agency is the owner of the site and has authority to give direction during this portion of the site investigation with respect to the proposed project. The consultant must also be aware that the work and recommendations of the consultant will be subject to the review of the Department Representative.

The consultant must advise, 48 hours in advance, the Departmental Representative of any adjustments in work location, work plan and method, implementation schedule, etc., during the course of the project.

The site must continuously be available for inspection by the Departmental Representative and/ or Field Unit Superintendent, who have authority to stop the work.

Consultants must have the approval of the Departmental Representative for any and all media releases, interviews, web site content or other media associated with the project. The Departmental Representative requires 24-72 hour notice prior to any form of media being released to the public to consult with personnel from Parks Canada External Relations.

Liability Insurance / Safe Work

The consultant will carry adequate insurance for the proposed project work; at minimum, the Consultant must possess or obtain Comprehensive General Liability insurance in an amount of \$2,000,000 inclusive per occurrence, insuring against bodily injury, personal injury and property damage including loss of use thereof. As well, the Consultant must also possess Automobile Liability insurance on all vehicles owned, operated, or licensed in the name of the Consultant in an amount not less than \$1,000,000, and "All Risk" valuable papers insurance.

Ensure a safe working environment for their staff as well as visitors to the project area(s). All applicable health and safety laws, regulations and requirements must be adhered to.

Submission of a detailed health and safety plan for the proposed project. This will include emergency contact information and emergency procedures.

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8.0 Intellectual Property

Principal Investigator under Contract with Parks Canada – Copyright, patents and all other intellectual property rights in anything first conceived, developed or reduced to practice by the Principal Investigator under contract in the performance of the work under contract shall vest in the Principal Investigator. The Principal Investigator will grant to Canada a non-exclusive, irrevocable, world-wide, and royalty-free license to use, copy or translate the work for government purposes. Copyright in any translation of the work made by Canada shall vest in Canada.

9.0 Parks Canada Agency Departmental Representatives

Project Manager, Bar U & Waterton Lakes National Park:

Dale Redford., P.Eng
Project Manager, Project Delivery Services West - Strategic Policy and Investment Directorate
Parks Canada
dale.redford@pc.gc.ca
Tel: 250-247-7693

Parks Canada, Terrestrial Archaeology:
Bill Perry
Archaeologist, Archaeology and History Branch
Indigenous Affairs and Cultural Heritage Directorate
Parks Canada, Calgary
bill.perry@pc.gc.ca
Tel 403-701-0614

10.0 References and Appendices

Amec Foster Wheeler
2018 “Bar U Ranch National Historic Site of Canada (1670R) Workhorse Barn (Building 17) and Bunkhouse #3 (Building 30) Rehabilitation Archaeological Impact Assessment. Final Report Permit No. BARU-2017-26757”. Submitted to Parks Canada, Waterton Lakes NP, March 2018. Manuscript on file, Terrestrial Archaeology, Parks Canada Agency, Calgary.

Heitzmann, Roderick J.
1993 Bar U Ranch National Historic Site Preliminary Archaeological Inventory and Assessment. Archaeological Services, Western Region, Canadian Parks Service, Calgary.

Heitzmann, Roderick J. and Ross W. Jamieson

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1998 Archaeological Resource Management Program 1995: Bar U Ranch National Historic Site. Archaeological Services, Parks Canada, Calgary Service Centre.

Parks Canada's Guidelines for the Management of Archaeological Resources, and
Parks Canada's Archaeological Recording Manual: Excavations and Surveys
<http://www.pc.gc.ca/eng/docs/pc/guide/fp-es/index.aspx>

Parks Canada's Cultural Resource Management (CRM) Policy
<http://www.pc.gc.ca/eng/docs/pc/poli/grc-crm/index.aspx>

Standards and Guidelines for the Conservation of Historic Places in Canada
<http://www.historicplaces.ca/en/pages/standards-normes.aspx>

Management Directive 2.3.1 HUMAN REMAINS CEMETERIES AND BURIAL GROUNDS

Management Directive 2.3.3 EXPLOSIVES: ARCHAEOLOGICAL DISCOVERY

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Appendix I: Frozen Ground Methods: Bar U Ranch

The following methods may be employed, if circumstances allow:

A. If sediments are possible to excavate/evaluate by shovel but not possible to screen due to clumping related to frozen soil moisture, all such sediments will be removed as samples, thawed in an indoor environment and fine screened in geological sieves, in order to identify and recover the cultural material present. This thawing and screening will be done in the evening after associated field operations so that any significant findings are known as soon as possible, in order to halt further excavation in the associated area until conditions allow for excavation by trowel. **PARKS CANADA PREFERS THIS METHOD NOT BE USED WHEREVER POSSIBLE.**

B. If frozen ground is encountered, a temporary structure such as a large tent or yurt may be erected over the imminent excavation area, with heat supplied by a generator or other energy source and heaters until the ground reaches an appropriate temperature for normal excavation procedures. Impact from erection of such a structure will have to be evaluated and appropriately mitigated in order to ensure that tent poles, etc. do not adversely impact the site.

C. Portable infrared ground warmers, such as propane-based ground warmers, may be utilized in order to thaw the ground in location-specific areas, according to each day's excavation needs. Insulating blankets and hay bales may be used in order to attempt to maintain the thawed state in these locations overnight.

D. Delay be required in order to ensure appropriate weather conditions. When these conditions are reached, insulating blankets and hay bales may be used in order to attempt to maintain the thawed state in these locations and prolong workable conditions.

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Appendix II

Collections Management Procedures for all

Terrestrial Archaeology Projects Related to the Federal Infrastructure Program (FIP)

ARTIFACT PROCESSING

The following procedures must be followed in order for the collection(s) to be accepted into the Parks Canada Collections Management facility (PCCMF).

1. All artifacts must be cleaned according to standard procedures for archaeological materials unless the cleaning process will destroy information.¹ Uncleaned items, should be bagged separately and labeled as such. It is understood that the level of cleaning may be minimal depending on the context and historic value of the artifacts.²
2. Only archivally stable packaging materials will be accepted into the PCCMF.
3. All artifacts must be packaged in appropriate containers, either 4ml zip-lock plastic bags or rigid boxes. Individual containers must be labeled with the appropriate provenience and content information, either directly on the container or with a label securely attached, so that the label cannot become separated from the container.
4. It is understood that not all items will be individually numbered. Grouping *like* items, for example sherds from the same object, is acceptable. These groupings can be placed together in a single bag and given one number
5. Artifacts removed from the ground wet must remain wet until they can be transferred to conservation for further assessment and treatment.
6. Artifacts requiring conservation treatment must be brought to the attention of PCTAR for further instruction.
7. All processed and labeled bags of artifacts must be placed in boxes (Fish or archivally acceptable bankers' boxes) sized 12"x15"x10" and weighing not more than 25lbs. Legible temporary labels must be attached to each box with the following information: site and provenience information, the contents, as well as the project name, name of excavator, date of excavation (year) and the number of boxes in the collection (1 of 10). The PCCMF will later affix a permanent label to the box with all the pertinent information.

1 Check with PCTAR (Parks Canada Terrestrial Archaeology) if you are unsure which artifacts should left uncleaned.

2 At a minimum, all objects will be dry brushed. All loose dirt and debris will be removed. .

APPENDIX C

Hazardous Material and Environmental Assessment

February 13, 2019



Public Services and Procurement Canada
Suite 1650, 635 8 Avenue SW
Calgary, Alberta
T5P 3M3

Attention: Ms. Natalie Robinson
Project Manager, Environmental Scientist

*Amendment 2 – Hazardous Material and Environmental Assessment,
Bar U Ranch, Longview, Alberta*

Dear Ms. Robinson:

Dillon Consulting Limited and Outcome Consultants in joint venture (Dillon-Outcome) were retained by Public Services and Procurement Canada (PSPC) on behalf of the Parks Canada Agency (PCA) to conduct a follow up bulk asbestos building materials sampling program at the workhorse barn located at the Bar U Ranch National Historical Site near Longview, Alberta.

At the request of PCA, the concrete floor and the faux log finish associated with the historical Workhorse structure were to be sampled and analyzed for the presence of asbestos fibres.

Scope of Work

The follow up sampling program is to support the 2019 rehabilitation activities of the historic building. The following scope of work was completed:

- Conducted a review of available information pertaining to asbestos containing materials at the Workhorse Barn;
- Conducted a site visit to collect representative samples of select building materials at the site;
- Submitted the bulk building materials samples to a certified laboratory for Polarized Light Microscopy (PLM) analysis;
- Evaluate the laboratory results; and,
- Preparation of this letter report summarizing laboratory analysis results and providing drawings showing sampling locations.

Methodology

Bulk sampling protocols generally followed the PSPC Asbestos Management Standard (October 2018), which indicates requirements for the number of samples to collect for each homogeneous material. By virtue of collecting multiple samples (min. of three (3))

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of each homogenous material observed in accordance with the PSPC Standard, quality control and quality assurance of the laboratory is ensured during the sampling program.

Three (3) core samples of the floor slab were recovered using a 75 mm diameter diamond core barrel rig under wet conditions. Three (3) concrete faux log samples, from the façade, were collected using clean hand tools at locations that were previous damaged. All samples were placed in clean plastic bags and transported by courier to EMSL Canada (EMSL) in Mississauga, ON, for analysis. EMSL Canada is certified under the National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. Samples were analyzed to determine asbestos type and percentage content using Polarized Light Microscopy and dispersion staining techniques in accordance with the United States Environmental Protection Agency (USEPA) methodologies. Prior to the PLM analysis, the concrete core samples were milled by the laboratory in order to reduce the nominal particle size to 75 microns.

The PLM laboratory detection limit is <1.0 %, which can be decreased by utilizing the point count approach, an analytical technique used to determine the quantity of asbestos fibres in a material. The EPA 600 PLM methodology contains a 400 point count approach which has a detection limit of 0.25% and a 1000 point count approach which has a detection limit of 0.1%.

The analytical results from the sampling are presented in Table 1-1 below. The laboratory analytical report is attached.

Bulk Sampling Results

The bulk sampling was completed on January 7, 2019 by Katelyn Broda, B.Sc., EIT of Dillon-Outcome. Sample locations were determined by Dillon-Outcome in consultation with Michael Mclean, the on-site CPA representative. A total of six (6) samples were submitted for analysis to EMSL. Laboratory certificates of analysis are attached. Photographs and Sample Locations Plans are also attached. The laboratory analysis results are summarized in Table 1-1 below:

Table 1-1: Analytical Results for Suspected ACM Bulk Samples – Bar U Ranch

Sample Number	Sample Description Location	Analytical Results
G1	Concrete floor core – south east	None Detected
G2	Concrete floor core – west central	None Detected
G3	Concrete floor core – north east	None Detected
F1	Concrete faux log finish – north wall	None Detected
F2	Concrete faux log finish – north wall behind door (surface layer)	None Detected
F3	Concrete faux log finish – north wall behind door (bottom layer)	None Detected

Bold – Indicates asbestos containing material (ACM).

Conclusion

Based on the laboratory analysis results, no asbestos fibres were detected in the samples of concrete floor slab or the faux log facing collected for analysis from the historical Workhorse barn.

Additional information regarding hazardous building materials at the site are detailed in Dillon-Outcome's "Bar U Ranch National Historical Site Hazardous Material and Environmental Assessment" report dated April 2018.

It should be noted if any building materials suspected to contain asbestos become uncovered, or are discovered during future demolition or renovation activities, work should be stopped where suspected building material may be disturbed. Samples of the suspected building material should be submitted for analysis to assess for the presence of asbestos fibres. Until laboratory results confirm the presence/absence of asbestos, the building materials should be handled as potentially an asbestos-containing material.

Closure

This report was prepared exclusively for the purposes, project, and site location outlined in the report. The report is based on information provided to, or obtained by Dillon-Outcome as indicated in the report, and applies solely to site conditions and the regulatory and planning frameworks existing at the time of the site investigation. Although Dillon-Outcome conducted a reasonable investigation, Dillon-Outcome's investigation was by no means exhaustive and cannot be construed as a certification of the absence of any contaminants from the site. Rather, Dillon-Outcome's report represents a reasonable review of available information within an established work scope and schedule.

Dillon-Outcome prepared this report for the sole benefit of our client. The material in it reflects Dillon-Outcome's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon-Outcome accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

If you have any questions regarding the information presented within this report, please contact the undersigned.

Sincerely,

DILLON CONSULTING LIMITED
AND OUTCOME CONSULTANTS IN JOINT VENTURE
(DILLON-OUTCOME)



Robert Hochkievich, C.E.T.
Report Author

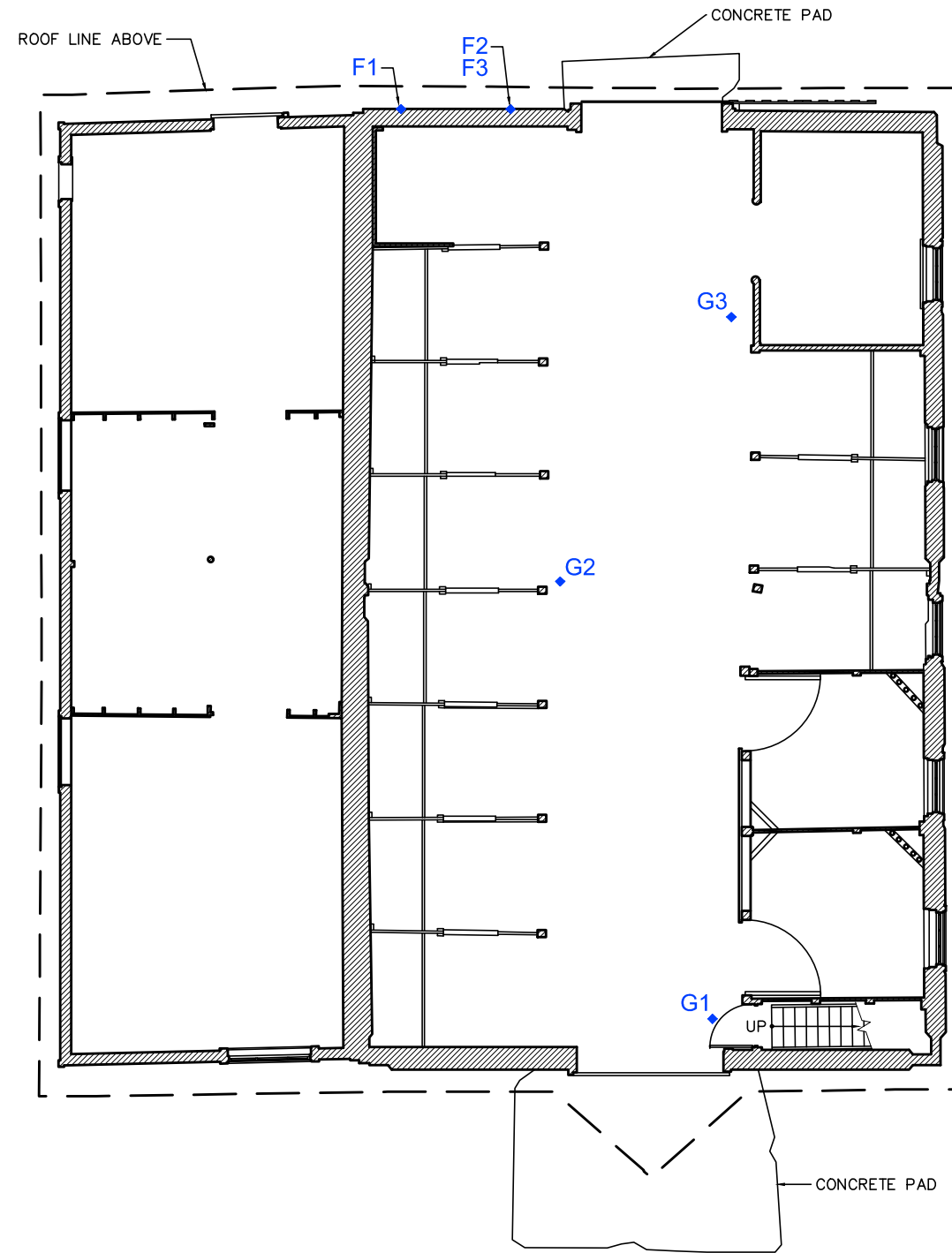


Paul Paulin, P.Eng.
Senior Technical Review

*Attachments: Sample Location Plan
Site Photographs
EMSL Canada Inc. Test Report – 551900153*

RPH:lf

Our file: 17-6786



FIRST FLOOR PLAN

LEGEND

- ◆ BULK SAMPLE LOCATION: NO ASBESTOS DETECTED

- Drawing Notes
1. No ACM or PACM identified during the 2019 sampling.
 2. Infrastructure locations are approximate only.


 DATE January 2019	PROJECT ASBESTOS SAMPLING BAR U RANCH - LONGVIEW, AB	PROJECT NO. 176786
	TITLE WORKHORSE BARN - ASBESTOS BULK SAMPLE LOCATIONS	DRAWING NO. 1



Photo 1

View of the Workhorse Barn at Bar U Ranch National Historic Site.



Photo 2

Sample G1 - concrete core of floor slab. No asbestos was identified in this sample.



Photo 3

View of Sample G2 location - concrete core of floor slab. No asbestos was identified in this sample.



Photo 4

Sample G3 - concrete core of floor slab. No asbestos was identified in this sample.








January 2019

SITE PHOTOGRAPHS: Workhorse Barn Bulk Asbestos Samples

Bar U Ranch National Historic Site - Longview, Alberta

PROJECT NO.
17-6786

PHOTO NO.
1,2,3,4

					
Photo 5	Photo 6				
Sample F1 - faux log finish on north wall of building (existing damage). No asbestos was identified in this sample.	View of north wall behind the door. Note the existing damage.				
					
Photo 7	Photo 8				
Location of Sample F2 and F3 prior to sampling.	Sample F2 and F3 - faux log finish on north wall (at completion of sampling). No asbestos was identified in this sample.				
 January 2019	<table><tr><td>SITE PHOTOGRAPHS: Workhorse Barn Bulk Asbestos Samples</td><td>PROJECT NO. 17-6786</td></tr><tr><td>Bar U Ranch National Historic Site - Longview, Alberta</td><td>PHOTO NO. 5,6,7,8</td></tr></table>	SITE PHOTOGRAPHS: Workhorse Barn Bulk Asbestos Samples	PROJECT NO. 17-6786	Bar U Ranch National Historic Site - Longview, Alberta	PHOTO NO. 5,6,7,8
SITE PHOTOGRAPHS: Workhorse Barn Bulk Asbestos Samples	PROJECT NO. 17-6786				
Bar U Ranch National Historic Site - Longview, Alberta	PHOTO NO. 5,6,7,8				



EMSL Canada Inc.

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EMSL Canada Order 551900153
Customer ID: 55DILL77
Customer PO: 17-6786
Project ID:

Attn: Rob Hochkovich
Dillon Consulting
1558 Willson Place
Winnipeg, MB R3T 0Y4

Phone: (204) 453-2301
Fax: (204) 452-4412
Collected: 1/ 7/2019
Received: 1/08/2019
Analyzed: 1/15/2019

Proj: 17-6786

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Client Sample ID: G1 **Lab Sample ID:** 551900153-0001

Sample Description: Concrete Core - Ground Floor (South-East)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	1/15/2019	Gray	0.0%	100.0%	None Detected	Milling prep was performed.

Client Sample ID: G2 **Lab Sample ID:** 551900153-0002

Sample Description: Concrete Core - Ground Floor (West-Central)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	1/15/2019	Gray	0.0%	100.0%	None Detected	Milling prep was performed.

Client Sample ID: G3 **Lab Sample ID:** 551900153-0003

Sample Description: Concrete Core - Ground Floor (North-East)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	1/15/2019	Gray	0.0%	100.0%	None Detected	Milling prep was performed.

Client Sample ID: F1 **Lab Sample ID:** 551900153-0004

Sample Description: Concrete Facade - North Wall (West of Track)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	1/15/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: F2 **Lab Sample ID:** 551900153-0005

Sample Description: Concrete Facade - North Wall (Behind Door - Surface Layer)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	1/15/2019	Gray	0.0%	100.0%	None Detected	

Client Sample ID: F3 **Lab Sample ID:** 551900153-0006

Sample Description: Concrete Facade - North Wall (Behind Door - Bottom Layer)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	1/15/2019	Gray	0.0%	100.0%	None Detected	



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EMSL Canada Order 551900153
Customer ID: 55DILL77
Customer PO: 17-6786
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for OHS Alberta Abatement Manual via EPA600/R-93/116 Method

Analyst(s):

Anne Balayboa PLM (2)
Caroline Allen PLM (4)

Reviewed and approved by:

Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 01/15/2019 13:34:55



EMSL CANADA, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

551900153

PHONE:
FAX:

Company : Dillon Consulting Limited		EMSL Customer ID: 55DILL36	
Street: 1558 Willson Place		City: Winnipeg	
Zip/Postal Code: R3T 0Y4	State/Province: Manitoba	Country: Canada	
Telephone #: 204-453-2301 ext. 4035		Email Address: rhochkievich@dillon.ca / kbroda@dillon.ca	
Project Name/Number: 17-6786		EMSL Project ID (Internal Use Only):	
Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email		Purchase Order:	State/Province Samples Taken: Alberta
EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different - If Bill to is Different note instructions in Comments** Third Party Billing requires written authorization from third party			
Turnaround Time (TAT) Options* - Please Check			
<input type="checkbox"/> 3 Hour	<input type="checkbox"/> 6 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 48 Hour
<input type="checkbox"/> 72 Hour	<input type="checkbox"/> 96 Hour	<input checked="" type="checkbox"/> 1 Week	<input type="checkbox"/> 2 Week
*For TEM Air 3 hours through 6 hours, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.			
PCM - Air <input type="checkbox"/> NIOSH 7400 <input type="checkbox"/> IRSST PCM		TEM - Air <input type="checkbox"/> AHERA 40 CFR, Part 763 <input type="checkbox"/> NIOSH 7402 <input type="checkbox"/> EPA Level II	
PLM - Bulk (reporting limit) <input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%) <input type="checkbox"/> 400 PTCT (<0.25%) <input type="checkbox"/> 1000 PTCT (<0.1%)		TEM - Bulk <input type="checkbox"/> TEM EPA NOB <input type="checkbox"/> IRRST TEM (NYS 198.4)	
<input type="checkbox"/> PLM EPA NOB (<1%) <input type="checkbox"/> 400 PTCT (<0.25%) <input type="checkbox"/> 1000 PTCT (<0.1%)		TEM- Dust <input type="checkbox"/> Microvac - ASTM D 5755 <input type="checkbox"/> Wipe - ASTM D6480	
<input type="checkbox"/> IRSST PLM <input type="checkbox"/> NIOSH 9002 (<1%) <input type="checkbox"/> Other		TEM - Water <input type="checkbox"/> EPA 100.2 (All fibre sizes) <input type="checkbox"/> EPA 100.2 (fibres >10µm)	
		Soil/Rock/Vermiculite <input type="checkbox"/> PLM EPA 600/R-93/116 with milling prep (<0.25%) <input type="checkbox"/> PLM EPA 600/R-93/116 with milling prep (<0.1%) <input type="checkbox"/> TEM EPA 600/R-93/116 with milling prep (<0.1%) <input type="checkbox"/> TEM EPA 600/R-93/116 with milling prep (<0.01%) <input type="checkbox"/> ASTM D7521 Sieve Method <input type="checkbox"/> TEM Qualitative via Filtration Prep <input type="checkbox"/> TEM Qualitative via Drop Mount Prep <input type="checkbox"/> Cincinnati Method EPA 600/R-04/004 - PLM/TEM* *(required for vermiculite in BC and NS)	
		Asphalt <input type="checkbox"/> PLM EPA Gravimetric with milling prep (<0.25%)	
<input type="checkbox"/> Check For Positive Stop - Clearly Identify Homogenous Groups		Filter Pore Size (Air Samples): <input type="checkbox"/> 0.8µm <input type="checkbox"/> 0.45µm	
Samplers Name: Katelyn Broda		Sampler's Signature: <i>Katelyn Broda</i>	

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
G1	Concrete core - ground floor (South-East)		Jan. 7, 2019
G2	Concrete core - ground floor (West-Central)		Jan. 7, 2019
G3	Concrete core - ground floor (North-East)		Jan. 7, 2019
F1	Concrete façade - north wall (West of Track)		Jan. 7, 2019
F2	Concrete façade - north wall (Behind Door - Surface Layer)		Jan. 7, 2019
F3	Concrete façade - north wall (Behind Door - Bottom Layer)		Jan. 7, 2019

Client Sample # (s):	G1, G2, G3	-	F1, F2, F3	Total # of Samples:	6
Relinquished (Client):	Dillon Consulting	Date:	January 7, 2019	Time:	
Received (Lab):		Date:		Time:	
Comments/Special Instructions:					

APPENDIX D

Geotechnical Report

File CG2728

Parks Canada

Geotechnical Investigation

Bar U Ranch National Historic Site

Clifton Associates



Parks Canada

Geotechnical Investigation

Bar U Ranch National Historic Site

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Appendices

Appendix A: Borehole Locations Plan

Appendix B: Borehole Logs, Symbols and Terms

1.0 Introduction

Clifton Associates Ltd. (Clifton) was retained by Parks Canada to provide a geotechnical investigation for the proposed development consisting of rehabilitation of the existing work house barn, equipment shed, bunkhouse/self-feeder and slaughterhouse. Authorization to proceed was provided by Jen Maheu, Contracting Officer with Parks Canada.

The objective of the investigation was to assess the subsurface soil and groundwater conditions and to provide recommendations for foundation design and construction. We assume that the final elevation of the proposed development is similar to the existing elevation at the time of Clifton's site investigation. The recommendations presented in the report are based on this assumption.

2.0 Background Information

2.1.1 Work House Barn

We understand that the current foundation of the building consists of a sandstone masonry wall on the original log portion of the barn to a depth measured at between 14" (350mm) and 18" (450mm), and a shallow concrete grade beam supporting the grain storage west addition measured at approximately 8" (200mm) on the south side. The present design concept is to rehabilitate the existing sandstone foundation and the log structure above, and to replace the foundation under the grain storage addition to create a crawl space.

2.1.2 Equipment Shed

A few existing sandstone foundation fragments have been identified to date but it is believed that the most of the structure has been built directly on the existing soil. It is proposed to raise and support the entire building on a new concrete foundation of an appropriate design and to a minimum depth, sufficient to minimize any future movement.

2.1.3 Bunkhouse/Self Feeder

There are presently two distinct alternatives for the bunkhouse/self-feeder building with respect to siting. It is proposed to provide a new concrete foundation system to support the wood frame structure. The structure will be placed on a foundation approximately 12" (300mm) above existing grade to allow for some sloping of the grade away from the building in the final configuration.

2.1.4 Slaughterhouse

It would appear that the slaughterhouse might have been constructed on a shallow series of sandstone flagstones as a foundation. The location of the building is on the north side of Pekisko Creek and at a lower elevation prone to more severe

flooding than the others. It is proposed to raise the wood frame building approximately 2'-0 (600mm) and to support it on a new concrete foundation that will minimize future movement to a degree appropriate for the size and type of structure.

3.0 Detailed Investigation

On 26 and 27 November 2015, seven (7) boreholes (BH4-BH10) were drilled using a track-mounted solid stem auger rig, supplied and operated by All Service Drilling of Airdrie, Alberta. The borehole locations are indicated on the Borehole Location Plan included in Appendix A. Boreholes BH4 to BH9 were drilled to the approximate depth of 6 m below ground surface (bgs). BH10 was drilled to a depth of 2.7 m bgs due to refusal on suspected gravel and cobbles.

Subsurface soil conditions were logged as drilling proceeded and disturbed soil samples were retrieved from the auger at select depth intervals. Standard Penetration Tests (SPT) were performed at select depth intervals. All samples were transported to Clifton's Calgary laboratory for soil index testing; which included moisture content testing, Atterberg limits and hydrometer grain size analysis. Selected soil samples were delivered to the chemical laboratory at ALS Canada Ltd. to measure water soluble sulphate concentrations. The soil stratigraphy, sampling depths and field and laboratory tests are shown on the Borehole Logs and a list of the symbols and terms used to classify the stratigraphy are included in Appendix B.

Slotted 25 mm PVC standpipes were installed in all boreholes with the exception of BH10. Standpipes were installed to allow for groundwater level monitoring. Groundwater measurements were completed on 3 December 2015.

All boreholes were backfilled with drill cuttings and sealed with bentonite at the surface. Excess drill cuttings were spread around the borehole locations.

4.0 Subsurface Conditions

The geological profile encountered at the site generally consisted of topsoil overlying silt, gravel, till and bedrock. A brief description of these deposits is given below.

4.1 Topsoil

All layer of topsoil was encountered at the surface of all borehole locations. The thickness of the layer ranged from 0.05 m to 0.1 m. The topsoil is described as silt, organic, black and moist. No in-situ or laboratory tests were conducted on the topsoil layer.

4.2 Silt

Silt was encountered in BH6, BH9 and BH10, below topsoil and extended to depths of 1.6 m, 2.1 m, and 2.7 m bgs, respectively. The silt is generally described as some gravel, trace sand, brown, loose to compact, moist and trace rootlets. Moisture contents of the silt samples were 4.4% to 17.9%. The SPT blow counts were ranged from 21 to 33 blows / 300 mm.

4.3 Gravel

Gravel was encountered in all boreholes, with the exception of BH10, below topsoil or silt. The gravel extended to depths between 2.0 m and 3.6 m bgs. Although not observed, gravel is suspected to be present in BH10 at a depth of 2.7 m bgs due

auger refusal. The gravel is described well-graded, rounded gravel and sand, brown, loose to dense and moist. Test results for gravel are presented in Table 1, below.

Table1: Summary of Test Results for Gravel		
SPT “N” Value (blow/300 mm)		
13-34		
Hydrometer Sieve Analysis		
Gravel %	Sand %	Silt/ Clay %
49.8-52.9	28.4-36.5	10.6-21.8

All gravel samples were tested for moisture content, with results ranging from 2.6 % to 12.0 %.

4.4 Silty Clay Till

Silty clay till was encountered in BH8 below gravel an extended to a depth of 4.4 m bgs. The till is described as containing traces of sand and gravel and in stiff to hard condition. In-situ test results for till are presented in Table 2, below.

Table 2: Summary of In-situ Test Results for Till	
Pocket Penetrometer (kg/cm ²)	SPT “N” Value (blow/300 mm)
2.25 – 4.0	26

All till soil samples were tested for moisture contents. Moisture contents of the silt samples were 10.6% to 16.0%.

4.5 Weathered Bedrock

Bedrock was encountered in all boreholes, with the exception of BH10, below gravel or silty clay till and extended to the termination depth of the boreholes. The bedrock is described as highly weathered mudstone, grey, very weak, soil-like and moist. A summary of in-situ and laboratory test results performed on the bedrock is provided in Table 3, below.

Table 3: Summary of In-situ and Laboratory Test Results for Weathered Bedrock	
SPT “N” Value (blow/300 mm)	Moisture Content (%)
50+	2.8-14

4.6 Groundwater

Standpipes were installed in all boreholes, except BH10, to allow for groundwater monitoring. Groundwater measurements were completed on 3 December 2015. A summary of measured groundwater levels is presented in Table 4, below.

Table 4: Groundwater Table Summary	
Borehole Number	Groundwater Measurement 3 December 2015 (m bgs)
BH4	2.7
BH5	2.7
BH6	2.2
BH7	2.3
BH8	2.4
BH9	2.3

Groundwater levels can be influenced by many variables and may not be representative of long term stabilized groundwater conditions. Variables, which affect groundwater readings, include, amongst others: surface infiltration, puncture of perched water horizons and inadequate time for stabilization of groundwater pressures.

It should also be recognized that groundwater levels vary from season to season and year to year and are dependent on many factors including surface drainage, precipitation and the hydrogeology of the area.

5.0 Comments and Recommendations

Based on the results of the investigation, the testing carried out and our understanding of the proposed development, we submit the following comments and recommendations:

5.1 Site Preparation

All topsoil, existing foundations (if new foundations are desired), organic soil, loose, soft or any other deleterious materials must be removed from beneath building structures or where engineered fill is needed to bring elevation to final grade. Upon removal of unsuitable material, the exposed subgrade should be reviewed by qualified geotechnical engineering personnel.

Within the Machine Shed area, the thickness of silt is anticipated to be varied from very little to 1.5m. From geotechnical perspectives, it is feasible to leave the existing silt within the structure and using compacted gravel to bring the grade up to the

finished level. It is recommended that 25 mm minus crushed gravel of at least 200 mm in thickness be placed on top of the silt layer. A layer of non-woven geotextile should be placed as a separator between the silt and the granular material to prevent soil migration.

The following gradation specification can be used on the 25mm minus crushed gravel.

Table 5: 25mm Minus Crushed Gravel Gradation	
Sieve Size (mm)	Percent Passing %
25	100
20	95-100
10	55-80
5	35-65
2.5	28-52
0.63	13-35
0.315	9-26
0.16	6-18
0.08	4-10

New fill material must not contain any organic matter, frozen material, or rocks over 200 mm in diameter. Cohesive fill should be placed in lifts not exceeding 200 mm loose measure, and be compacted to minimum 98% SPMDD. The moisture content at placement should be within 0% to +2% of its Optimum Moisture Content (OMC) for compaction purposes.

Granular fill should be placed in lifts not exceeding 300 mm loose measure, depending on compaction equipment used, and be compacted to minimum 98% SPMDD. The moisture content at placement should be within $\pm 3\%$ of its OMC for compaction purposes. A non-woven geotextile is recommended to be placed between native cohesive soils and granular fill to prevent migration of coarse particles into the cohesive subgrade during compaction.

Subgrade surfaces should be protected from freezing. In addition, the subgrade should be protected from wetting or drying, both before and after the placement of fill. Subgrade surfaces that are allowed to dry or become wet must be scarified, moisture conditioned, and re-compacted.

5.2 Frost Susceptibility

The near surface soil encountered at the locations consist of silt and gravel. The maximum seasonal frost penetration depth was calculated for the near-surface soils using the procedure described in CFEM 4th Edition Section 13-4. A mean freezing index of 995°C degree days was used for the location. The average seasonal frost penetration depth is estimated to be approximately 2.1 m. The estimated frost penetration depth assumes a uniform soil type without topsoil and snow cover. The silt and gravel soil encountered at the area is classified as frost susceptible soil and non-frost susceptible soil, respectively.

5.3 Foundation for Equipment Shed, Bunkhouse/Self Feeder and Slaughter house

Shallow (i.e. spread and strip footings) and deep (i.e. piled) foundation systems are considered feasible for the proposed rehabilitation. Even though the gravel soil is classified as non-frost susceptible soil, it is our opinion that the foundations will be affected by frost heave or adfreeze stresses due to shallow groundwater level.

5.3.1 Shallow Foundations

Any shallow foundation should have a minimum soil cover of at least 2.1 m for frost protection purposes. Alternatively, insulation can be used to reduce the required thickness of the soil cover for frost protection. As a general guide, each 25 mm of insulation may be assumed to provide approximately 0.3 m of equivalent soil cover. Insulation used for frost protection should be placed at a minimum depth of 0.6 m below the finished ground surface and the top 0.6 m of backfill should be ignored for equivalent frost penetration calculation purposes. Rigid insulation should extend a minimum of 2.4 m beyond the exterior edge of foundation in order to control frost penetration.

The insulation supplier should be consulted for the detailed design of insulations.

Shallow foundations in the form of spread and strip footings founded on native undisturbed soil are considered suitable for the soil conditions encountered at the project site. The geotechnical soil bearing resistance at Ultimate Limit States (ULS) for spread and strip footings vary with footing widths and embedment depths. The embedment depth is to be measured from ground surface or from the top of adjacent non-structural slabs-on-grade, whichever is less.

The following table shows the factored geotechnical bearing capacity with varied embedment depth and with the width ranging from 0.5 m to 2.5 m.

Table 6: Factored Bearing Capacity for Shallow Foundation with Various Embedment Depth

	Embedment Depth (m)				
	2.1	1.2	1	0.8	0.5
Factored Bearing Capacity (kPa)	230	140	115	95	65

For footings with minimum embedment depths of 2.1 m and widths ranging from 0.5 to 2.5 m, the unfactored geotechnical bearing resistance at ULS can be taken as 400 kPa for gravel and 300 for silt. A resistance factor of 0.5 as per Nation Building Code of Canada should be applied to determine the factored bearing resistance at ULS. When applying the recommended factored ultimate geotechnical bearing resistance (200 kPa for gravel and 150 kPa for silt), total and differential settlements are expected not to exceed 25 and 20 mm, respectively.

The geotechnical bearing resistance at ULS generally increases with footing width and depth. However, larger footings are subject to increased settlement. A detailed settlement analysis should be completed for footings in excess of 2.5 m width to determine the geotechnical bearing pressure at Serviceability Limit State (SLS), or potential impact of total and differential settlement on the building superstructure.

The geotechnical bearing resistances presented above are for vertical, concentric loading as described in the CFEM (2006). If footings will be subject to eccentric and/or inclined loads, the bearing resistances need to be adjusted as outlined in CFEM (2006).

Bearing surfaces shall be protected from ingress of free water, typically resulting in softening of the soil. Footings must not be placed on non-engineered fill, organic, disturbed, or frozen soil. Bearing material that becomes frozen, dried or softened must be removed and replaced with lean mixed concrete, or the footings shall be extended to reach material in an unaffected condition. If freezing of the soil below the constructed footing is suspected, the soil and the foundation must be inspected by qualified geotechnical engineering staff prior to continuing construction. It is also essential the foundation soil not be allowed to freeze before and after the concrete for the footing has been placed. All foundation elements should be placed on undisturbed and clean surfaces.

It is also recommended that all foundation bearing soils be inspected by geotechnical engineering staff to confirm that the bearing surface conditions are consistent with the design assumptions presented in this report.

5.3.2 Deep Foundations

Deep foundations in the form of drilled/bored cast-in-place concrete rock socket piles or helical (screw piles) are also considered suitable to support the structures.

5.3.2.1 Drilled / Bored Cast-In-Place Concrete Pile

The recommended un-factored ultimate skin friction and end bearing resistances for the design of concrete piles is provided in Table 7.

Table 7: Unfactored Ultimate Pile Resistance Design Parameters for Drilled / Bored Cast-in-Place Concrete Rock Socket Piles		
Subsurface Material	Ultimate Skin Friction q_s (kPa)	Ultimate Bearing Capacity q_t (kPa)
Highly Weathered, Very Weak, Soil Like Bedrock	80	750

A geotechnical resistance factor of 0.4 shall be used for axial compression loading based on static design parameters. The uplift resistance of a single straight shaft pile may be calculated using the axial shaft resistance (i.e. no contribution from the pile tip) and the weight of the pile itself. A geotechnical resistance factor of 0.3 shall be applied to the ultimate skin friction to determine the geotechnical factored ultimate axial resistance under uplift lift conditions.

Adfreeze stresses of 65 kPa acting along the pile shaft are recommended within the zone that would be subject to frost heave, Where frost jacking and transient uplift loads (such as wind loading) occur simultaneously, these two loads need not to be considered together; the larger of the two shall be used.

Piles spaced at greater than 2.5 pile diameters (center-to-center) can be assumed for design purposes to act as single piles, with no group interaction effects with regards to geotechnical axial resistance. For piles spaced at less than 2.5 diameters, the ultimate pile geotechnical axial resistance shall be reduced by a group reduction factor. For design, these group factors may be approximated as:

- 1.0 for piles at a spacing of 2.5 diameters; and
- 0.85 for piles at a spacing of 1.25 diameters.

Group reduction factors for other pile spacing may be interpolated from the values above.

For the design of single piles with diameters ranging between 0.6 and 1.5 m, serviceability limit states (SLS) is not considered relevant as the settlement of individual piles designed using the geotechnical design parameters and resistance factors above is anticipated to be less than 25 mm. The design of pile groups may be governed by SLS conditions and further analysis will be required.

Cast-in-place concrete piles should have a minimum shaft diameter of 600 mm; otherwise end bearing resistance should be ignored in pile design. To achieve the shaft and toe resistance values shown in Table 7, the sides and base of the pile must be free of water and loose or remolded material prior to placing concrete. As per Alberta Building Code, inspection by qualified geotechnical representatives during pile installation is required to ensure that the recommended friction and end-bearing values are obtained. Piles should be concreted immediately following inspection, to reduce potential for sloughing and/or accumulation of seepage. Due to the existing groundwater, temporary casing are likely required to prevent seepage ingress during pile installation.

5.3.2.2 Helical Piles

Helical or screw piles would also be a feasible foundation. Screw piles have a steel pipe shaft with helical plates welded to the outside of the shaft near the base of the pile and/or selected points on the shaft. The pile is advanced into the ground by a torque drive head. Bearing capacity is developed from compression bearing resistance from the soil below the helix(s) and/or cylindrical shear resistance developed between multiple helices. Standard shaft sizes range from 0.217 m to 0.508 m with helix diameters approximately double the shaft diameter. Actual pile size and helix details vary from contractor to contractor. As it is a proprietary system, design recommendations should come from an experienced screw pile contractor based on the soil and strength data presented in this report.

While helical piles are generally considered feasible at this site, the following items should be addressed by the helical pile contractor/designer:

- Cobbles and boulders may exist in the gravel layer. If encountered, these large particles can lead to early refusal or helix damage.
- Geotechnical axial compressive and tensile resistance factors of 0.4 and 0.3, respectively, should be used in design unless load testing of proposed helical pile is completed in advance of production piling.
- Any gaps around the shaft after installation should be filled with sand or cementitious grout.
- Should installations be scheduled to occur when the subgrade is frozen, an allowance should be made for pre-drilling through frost and backfilling annulus with sand or cementitious grout.
- The penetration rate of a screw pile as it is rotated into the ground should be equal to the pitch of the helix plate. The spacing between the helix plates should be in even multiples of the pitch, such that the paths travelled by upper helices are coincidental with the path of the lower-most helix.

- Monitoring of the pile installation by qualified personnel is recommended to confirm that the screw piles are installed in accordance with acceptable installation procedures. To provide an indication of the vertical load resistance, the monitoring should include measurement and recording of the torques applied during installation of each pile.
- It is recommended that the uppermost helix is founded one full helix diameter below design frost depth to provide adequate uplift resistance to frost heave due to adfreeze.

5.4 Work Horse Barn

As mentioned, the design concept for the Work Horse Barn is to maintain the existing foundation system and to rehabilitate the structure above. The existing foundation of the building consists of sandstone masonry wall and the sandstones were placed above frost penetration depth and they were not protected by any insulation. We understand that there was no frost heave case reported at the Work House Barn. We also understand that due to the existing concrete slab, installing insulation is not feasible.

The existing foundation system can be considered as a “flexible” foundation system which can be designed to adapt some degrees of surface movement. Some degree of movement is expected to occur over time due to frost heave. The structure founded on the sandstone blocks foundations should be regularly inspected to detect evidence of overturning, tilting, or otherwise decreasing performance. In general, the foundations should be inspect to accommodate potential differential settlement / movement exceeding tolerable limits over the length of the foundation (typically $\delta/l \geq 300$, δ =differential settlement, l =foundation length).

5.5 Excavation

Temporary excavations at the site should be sloped or shored for worker and foundation protection. Construction must conform to good practice and comply with the regulations, such as the Alberta Building Code.

According to the Occupational Health and Safety Code Part 32, the site soil is classified as “soft, sandy, or loose soil”; therefore, the walls of temporary excavations up to 3.0 m in depth should be sloped at an angle of not less than 45° measured from the vertical.

Deeper excavations should be shored or sloped at a flatter angle. All deeper excavations should be subject to a detailed slope stability analysis to determine minimum slope angles and other means to provide a safe temporary work environment. Qualified geotechnical personnel should be notified if excavations with more than 3 m depths are required.

Excavations must be protected from rain, snow or any ingress of free water. Prolonged exposure of excavated areas should be avoided to prevent deterioration of exposed soil with resultant slope instability. Similarly, excavated materials should be stockpiled away from the excavations to avoid any slope instability and to prevent materials from falling back into the excavations. Temporary surcharge loads, such as stocks of material or heavy equipment, should be kept back from excavation faces a distance equal to the excavation depth.

5.6 Dewatering and Surface Drainage

Final grading of the site should contain gentle slopes such that any surface water is directed away from any structure. Water should be directed into catch basins or drainage swales leading to suitable discharge facilities. In general, drainage conditions should be implemented so that rainwater will not collect or pond.

Dewatering of excavations will be dependent upon weather conditions and the time of year of construction. If seepage is encountered during construction, groundwater may be controlled by sump and pumping methods. The groundwater level should be maintained a minimum of 0.5 m below excavation grade at all times.

Due to shallow groundwater level, a weeping tile system is recommended. The system should consist of a 100 mm diameter slotted or perforated PVC pipe surrounded by a minimum of 150 mm of free draining gravel. The gravel should be surrounded by a non-woven geotextile filter fabric. This will minimize the potential for fines migration into the weeping tile system, thus extending the life of the system.

5.7 Seismic Design Considerations

Based on the Alberta Building Code 2006 Table 4.1.8.4.A, it is recommended that the site be considered class “C” for seismic design purposes.

5.8 Water Soluble Sulphate Concentration and Sulphate Exposure Classification

To determine the potential of sulphate attack on concrete in contact with soils at the site, five (5) soil sample was tested for water-soluble sulphates content. These results indicate a negligible degree of exposure. As such, general use (GU) should be used.

Any imported soils should be tested to determine water-soluble sulphate concentration and associated sulphate exposure classification.

6.0 Review of Design and Construction Inspection

Clifton should be given the opportunity to review final designs, drawings and specifications, related to the geotechnical aspects of the proposed development, to ensure that our comments and recommendations have been properly interpreted and implemented.

Construction review and testing of site grading operations and foundation installations should be carried out in accordance with the Alberta Building Code. This is to observe and verify actual soil and compaction conditions during construction and to provide any modified or supplemental recommendations, if required.

7.0 Limitations and Closures

This report was prepared by Clifton for the use of Parks Canada and its agents for specific project within the Bar U Ranch National Historic Site. The material and recommendations within this report reflects Clifton's best judgment available at the time of the report preparation. Use of this report by a third party or any decisions made based on it is the responsibility of such third party. Clifton accepts no responsibility for damage, if any suffered by a third party as a result of their use of this report.

The conclusion and recommendations are solely based on the subsurface conditions encountered during the site investigation. This subsoil investigation was performed for the specific purpose of characterizing the subsurface conditions for the purpose of foundation design recommendations for the proposed development on the site. Geotechnical factors presented in this report were based on the subsurface conditions encountered within the boreholes advanced at the site in question. Soil conditions present at the site may vary significantly between the locations tested. Groundwater conditions are subject to fluctuations dependent on many factors affecting the hydrogeology of the site. Should subsoil conditions other than those presented be encountered during the construction phase, it would be vital that Clifton be notified in order for the recommendations outlined in this report to be re-evaluated as necessary. The enclosed report contains the results of the investigation, as well as recommendations arising from the investigation. Recommendations do not constitute a design, in whole or in part, of any of the elements of the proposed works. Incorporation of any or all of the recommendations into the design of any such element does not constitute Clifton as designers or co-designers of such elements, nor does it mean that such design is appropriate in geotechnical terms. The designer of such elements must consider the appropriateness of the recommendations in the light of all design criteria known to them, many of which may not be known to Clifton. Clifton's mandate has been to investigate and recommend, which has been completed by means of this report. Clifton had no mandate to design, or review the design of, any elements of the proposed works and accepts no responsibility for such designs or design review.

Yours Truly,
Clifton Associates Ltd.

Garrett Mayerchak, TT
Geotechnical Technologist

Jerry Leung, P.Eng.
Geotechnical Engineer



Association of Professional Engineers, Geologists and Geophysicists of Alberta, Permit to Practice 4823

Appendix A

Clifton Associates

Borehole Locations Plan

Clifton Associates



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Borehole Location Plan

Note: Not to scale

File CG2728



Approximate Borehole Locations

Appendix B

Clifton Associates

Borehole Logs, Symbols and Terms

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BOREHOLE LOG

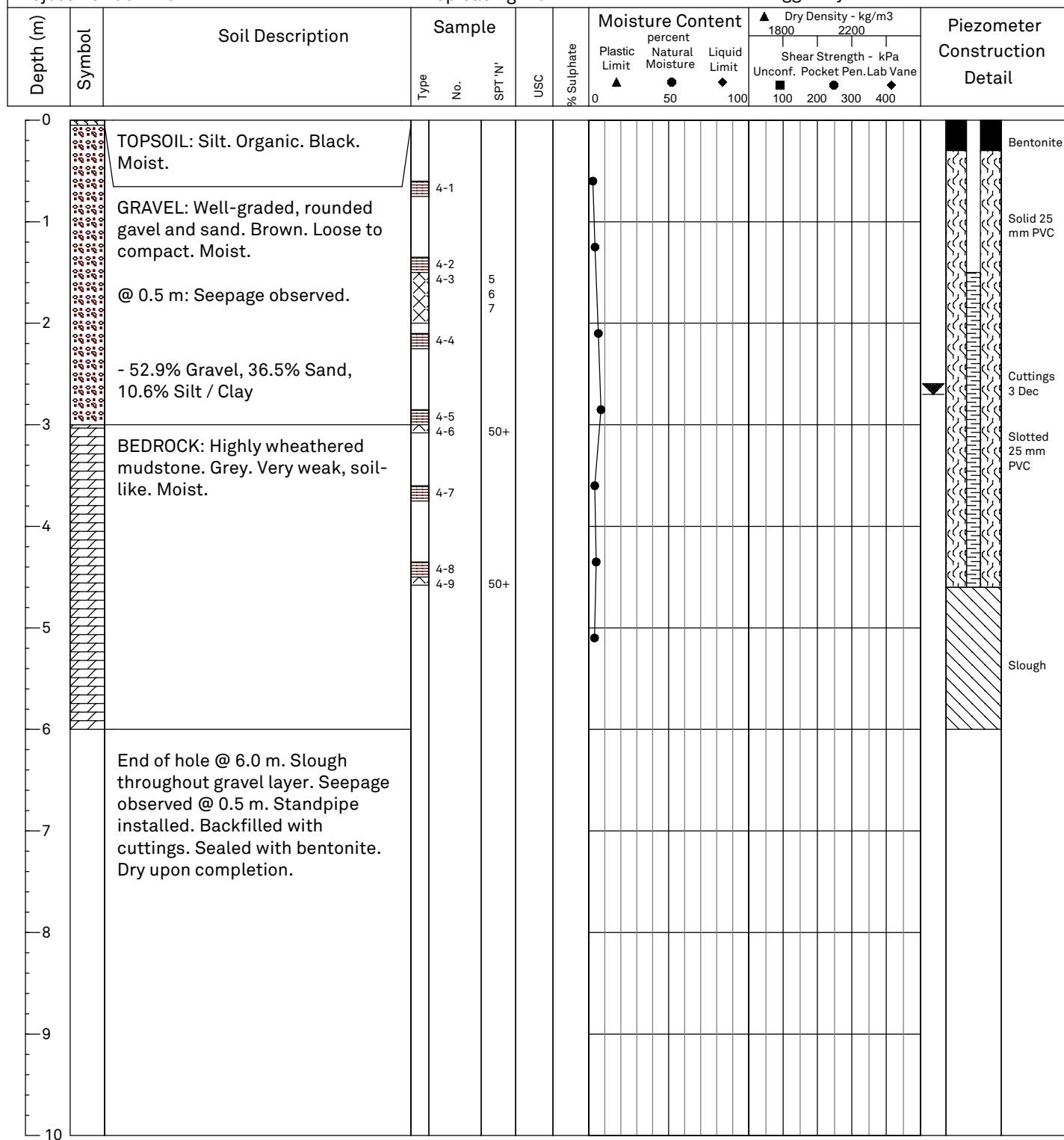
Borehole: BH4

Page: 1 of 1

Client: Parks Canada
 Project: Geotechnical Investigation
 Location: Bar U Ranch
 Project No.: CG2728

Northing: 5588924
 Easting: 696430
 Ground Elev.: 0
 Top Casing Elev.:

Date Drilled: 26 Nov 2015
 Drill: D-120
 Drilling Method: Solid Stem Auger
 Logged by: GM




Clifton Associates

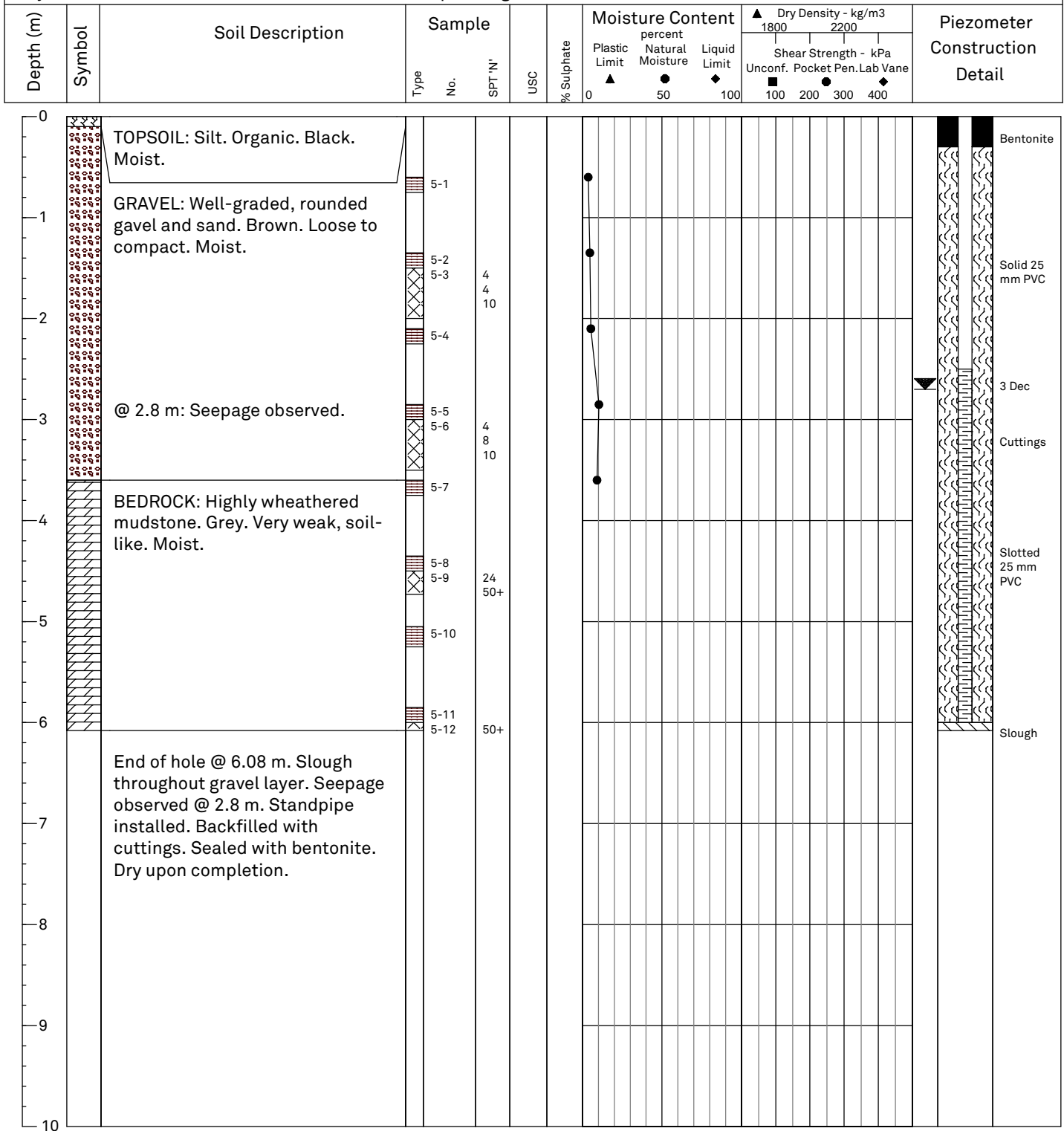
BOREHOLE LOG

Borehole: BH5
Page: 1 of 1

Client: Parks Canada
 Project: Geotechnical Investigation
 Location: Bar U Ranch
 Project No.: CG2728

Northing: 5588932
 Easting: 696453.6
 Ground Elev.: 0
 Top Casing Elev.:

Date Drilled: 27 Nov 2015
 Drill: D-120
 Drilling Method: Solid Stem Auger
 Logged by: GM





BOREHOLE LOG

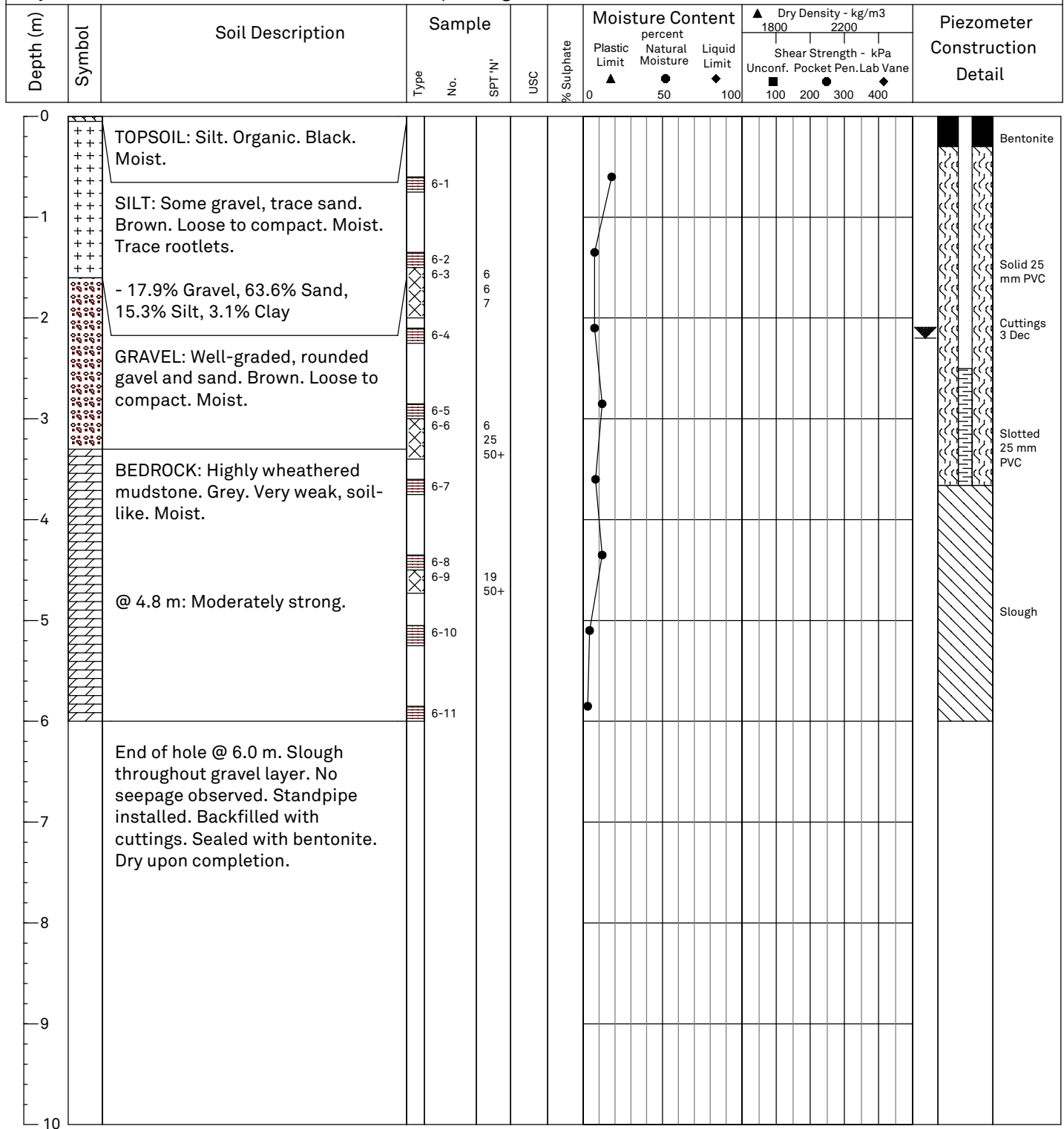
Borehole: BH6

Page: 1 of 1

Client: Parks Canada
Project: Geotechnical Investigation
Location: Bar U Ranch
Project No.: CG2728

Northing: 5588901
 Easting: 696429
 Ground Elev.: 0
 Top Casing Elev.:

Date Drilled: 27 Nov 2015
Drill: D-120
Drilling Method: Solid Stem Auger
Logged by: GM





BOREHOLE LOG

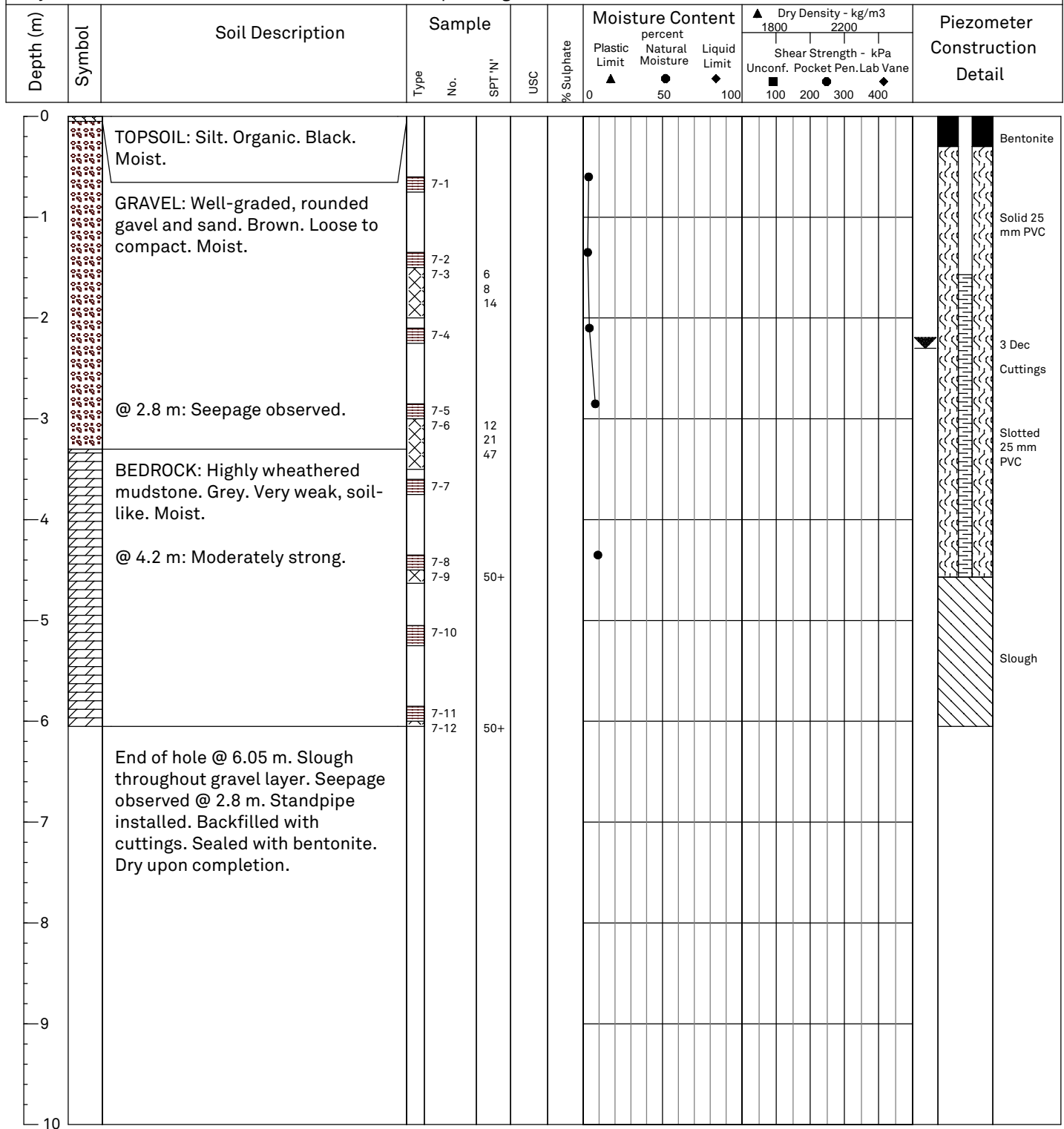
Borehole: BH7

Page: 1 of 1

Client: Parks Canada
 Project: Geotechnical Investigation
 Location: Bar U Ranch
 Project No.: CG2728

Northing: 5588889.9
 Easting: 696470.6
 Ground Elev.: 0
 Top Casing Elev.:

Date Drilled: 27 Nov 2015
 Drill: D-120
 Drilling Method: Solid Stem Auger
 Logged by: GM





BOREHOLE LOG

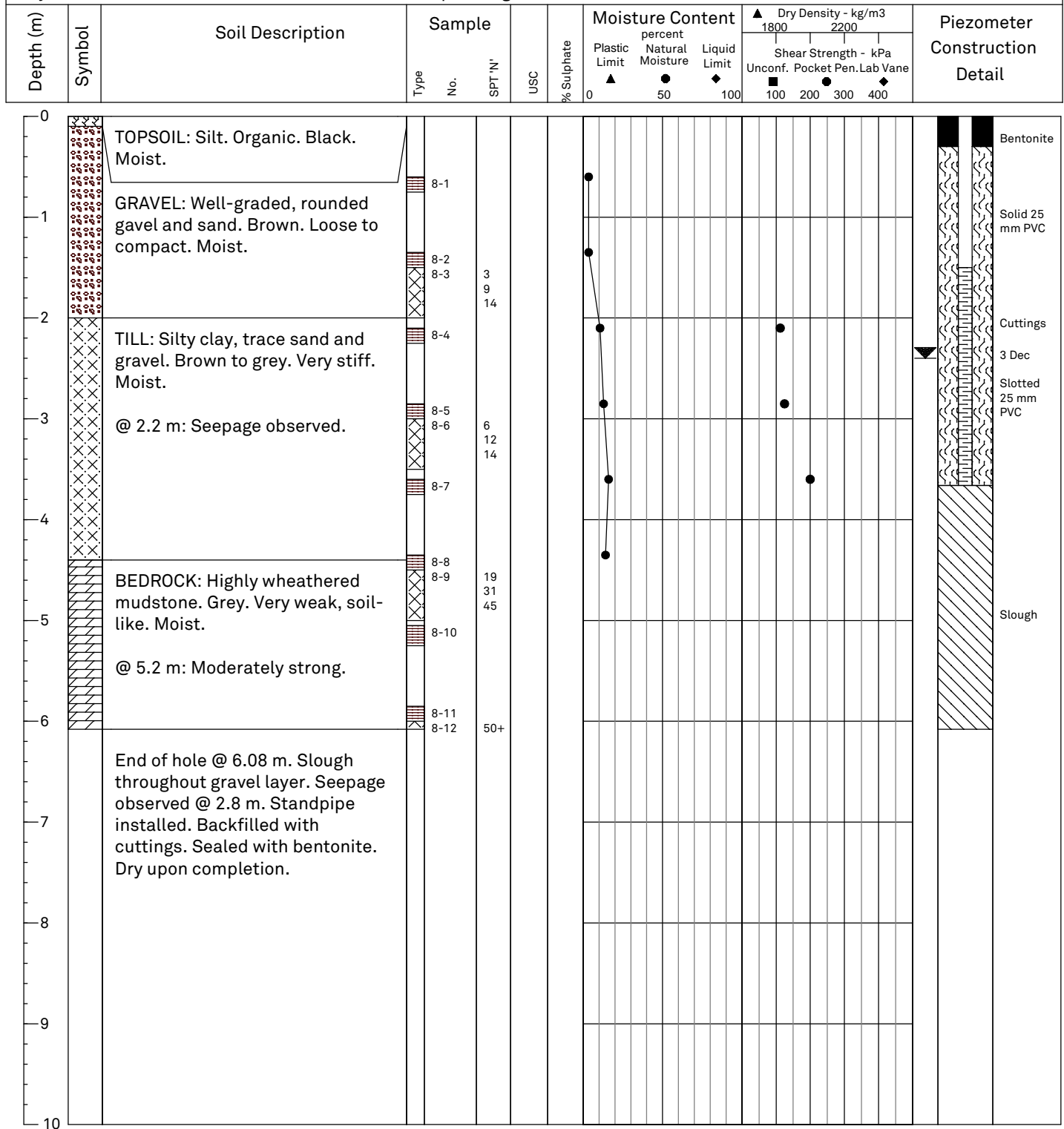
Borehole: BH8

Page: 1 of 1

Client: Parks Canada
 Project: Geotechnical Investigation
 Location: Bar U Ranch
 Project No.: CG2728

Northing: 5588867.6
 Easting: 695446.2
 Ground Elev.: 0
 Top Casing Elev.:

Date Drilled: 27 Nov 2015
 Drill: D-120
 Drilling Method: Solid Stem Auger
 Logged by: GM





BOREHOLE LOG

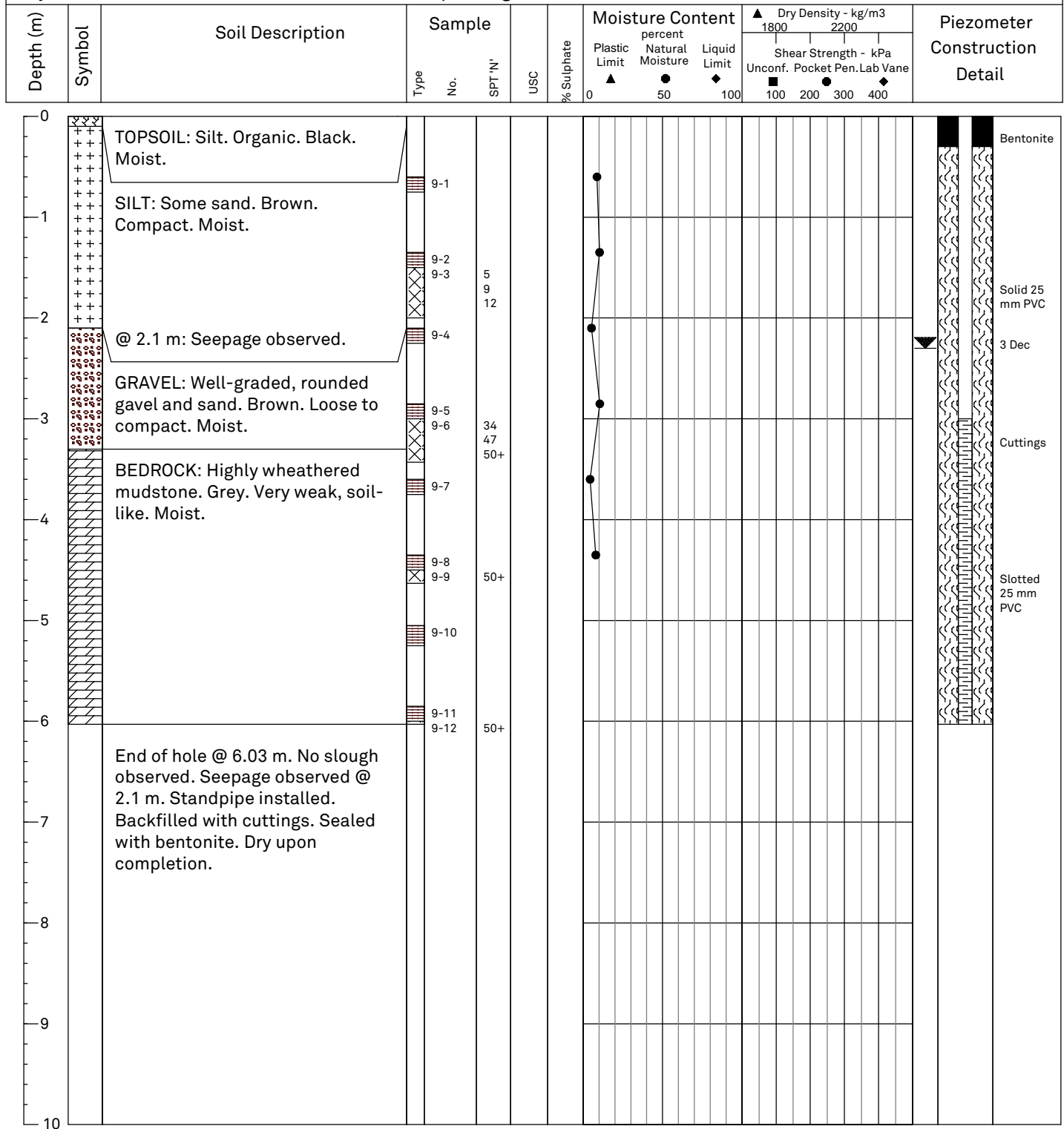
Borehole: BH9

Page: 1 of 1

Client: Parks Canada
 Project: Geotechnical Investigation
 Location: Bar U Ranch
 Project No.: CG2728

Northing: 5589106.9
 Easting: 695535.5
 Ground Elev.: 0
 Top Casing Elev.:

Date Drilled: 27 Nov 2015
 Drill: D-120
 Drilling Method: Solid Stem Auger
 Logged by: GM





BOREHOLE LOG

Borehole: BH10

Page: 1 of 1

Client:	Parks Canada
Project:	Geotechnical Investigation
Location:	Bar U Ranch
Project No.:	CG2728

Northing:	5589281.1
Easting:	695731.6
Ground Elev.:	0
Top Casing Elev.:	

Date Drilled: 27 Nov 2015
Drill: D-120
Drilling Method: Solid Stem Auger
Logged by: GM

[illegible]

Soil Descriptive Terms

A soil description for geotechnical applications includes a description of the following properties:

- texture
- color, oxidation
- consistency and condition
- primary and secondary structure

Texture

The soil texture refers to the size, size distribution and shape of the individual soil particles which comprise the soil. The Unified Soil Classification System (ASTM D2487-00) is a quantitative method of describing the soil texture. The basis of this system is presented on the following page. The following terms are commonly used to describe the soil texture.

Particle Size (ASTM D2487-00)	
Boulder	300 mm plus
Cobble	75 – 300 mm
Gravel	4.75 – 75 mm
Coarse	19 – 75 mm
Fine	4.75 – 19 mm
Sand	0.075 – 4.75 mm
Coarse	2 – 4.75 mm
Medium	0.425 – 2 mm
Fine	0.075 – 0.425 mm
Silt and Clay	Smaller than 0.075 mm

Relative Proportions (CFEM, 4th Ed., 2006)	
Trace	1 – 10 %
Some	10 - 20 %
Gravelly, sandy, silty, clayey, etc.	20 – 35 %
And	>35 %
Gravel, Sand, Silt, Clay, etc.	35% and main fraction

Gradation	
Well Graded	Having a wide range of grain sizes and substantial amount of all intermediate sizes.
Uniform or Poorly Graded	Possessing particles of predominately one size.
Gap Graded	Possessing particles of two distinct sizes.

Particle Shape	
Angular	Sharp edges and relatively plane sides with unpolished face.
Subangular	Similar to 'angular' but have rounded edges.
Subrounded	Well-rounded corners and edges, nearly plane sides.
Rounded	No edges, has smoothly curved sides. Also may be flat, elongated, or both.

The term "TILL" may be used as a textural term to describe a soil which has been deposited by glaciers and contains an unsorted, wide range of particle sizes.

Colour and Oxidation

The soil color at its natural moisture content is described by common colors and, quantitatively, in terms of the Munsell color notation; (eg. 5Y 3/1). The notation combines three variables, hue, value and chroma to describe the soil color. The hue indicates its relation to red, yellow, green, blue and purple. The value indicates its lightness. The chroma indicates its strength of departure from a neutral of the same lightness. Departure of the soil color from a neutral color indicates the soil has been oxidized. Oxidation of a soil occurs in a oxygen rich environment where most commonly metallic iron, oxidizes and turns a neutral colored soil 'rusty' or reddish brown. Oxidized manganese gives a purplish tinge to the soil. Oxidation may occur throughout the entire soil mass or on fracture/joint/fissure surfaces.

Classification of Soils for Engineering Purposes

ASTM Designation D 2487-00 (Unified Soil Classification System)

Major Divisions			Group Symbol	Typical Names	Classification Criteria	
Coarse-grained soils More than 50% retained on No. 200 sieve* (>0.075 mm)	Gravels More than 50% of coarse fraction retained on No. 4 sieve(4.75 mm)	Clean gravels <5% fines	GW	Well-graded gravel	Classification on basis of percentage of fines: Less than 5% pass No. 200 sieve - GW, GP, SW, SP More than 12% pass No. 200 sieve - GM, GC, SM, SC 5 to 12% pass No. 200 sieve - Borderline classifications, use of dual symbols	$C_u = \frac{D_{60}}{D_{10}} \geq 4$; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravel		Not meeting either C_u or C_c criteria for GW
		Gravels with >12% fines	GM	Silty gravel		Atterberg limits below 'A' line or PI less than 4
			GC	Clayey gravel		Atterberg limits on or above 'A' line and PI > 7
	Sands 50% or more of coarse fraction passes No. 4 sieve(4.75 mm)	Clean sands <5% fines	SW	Well-graded sand		$C_u = \frac{D_{60}}{D_{10}} \geq 6$; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sand		Not meeting either C_u or C_c criteria for SW
		Sands with >12% fines	SM	Silty sand		Atterberg limits below 'A' line or PI less than 4
			SC	Clayey sand		Atterberg limits on or above 'A' line and PI > 7
Fine-grained soils 50% or more passes No. 200 sieve* (<0.075 mm)	Silt and Clays Liquid Limit <50%	Inorganic	ML	Silt	If 15 to 29% coarse grained, add "with sand" or "with gravel" as appropriate. If >30% coarse grained, add "sandy" or "gravelly" as appropriate. Class as organic when oven dried liquid limit is <75% of undried liquid limit.	Plasticity Chart
			CL	Lean Clay -low plasticity		
	Silt and Clays Liquid Limit >50%	Organic	OL	Organic clay or silt (Clay plots above 'A' Line)		
		Inorganic	MH	Elastic silt		
			CH	Fat Clay -high plasticity		
	Highly Organic Soils	Organic	OH	Organic clay or silt (Clay plots above 'A' Line)		
			PT	Peat, muck and other highly organic soils		

*Based on the material passing the 3 in. (75 mm) sieve, if field samples contain cobbles or boulders, add "with cobbles or boulders" to group name

Consistency and Condition

The consistency of a cohesive soil is a qualitative description of its resistance to deformation and can be correlated with the undrained shear strength of the soil. The condition of a coarse grained soil qualitatively describes the soil compactness and can be correlated with the standard penetration resistance (ASTM D1586-99).

Consistency of Cohesive Soil (CFEM, 4th Edit., 2006)		
Consistency	Undrained Shear Strength (kPa) (CFEM, 4th Edit., 2006)	Field Identification (ASTM D2488-00)
Very Soft	<12	Thumb will penetrate soil more than 25 mm.
Soft	12 – 25	Thumb will penetrate soil about 25 mm.
Firm	25 – 50	Thumb will indent soil about 6 mm.
Stiff	50 – 100	Thumb will indent, but penetrate only with great effort (CFEM).
Very stiff	100 – 200	Readily indented by thumbnail (CFEM).
Hard	>200	Thumb will not indent soil but readily indented with thumbnail.
Very Hard	N/A	Thumbnail will not indent soil.

Consistency of Coarse Grained Soil (CFEM, 4th Edit., 2006)	
Compactness Condition	SPT N – Index (Blows/300mm)
Very Loose	0 – 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	Over 50

Moisture Conditions (ASTM D2488-00)	
Description	Criteria
Dry	Absence of moisture, dusty, dry to touch.
Moist	Damp but no visible water.
Wet	Visible, free water, usually soil is below water table.

Structure

The soil structure is the manner in which the individual soil particles are assembled to form the soil mass. The primary soil structure is the arrangement of soil particles as originally deposited. The secondary soil structure refers to any rearrangement of the soil such as deformation and cracking which has taken place since deposition.

Primary Soil Structure (Depositional)

Geometry

Stratum	- A single sedimentary 'layer', greater than 10 mm in thickness, visibly separable from other strata by a discrete change in lithology and/or sharp physical break.
Homogeneous	- Same colour and appearance throughout.
Stratified	- Consisting of a sequence of layers which are generally of contrasting texture or colour.
Laminated	- Stratified with layer thickness between 2 – 10 mm.
Thinly Laminated	- Stratified with layer thickness less than 2 mm.
Bedded	- Stratified with layer thickness greater than 10 mm.
Very Thinly Bedded (Flaggy)	- Stratified with layer thickness between 10 – 50 mm.
Thinly Bedded (Slabby)	- Stratified with layer thickness between 50 – 600 mm.
Thickly Bedded (Blocky)	- Stratified with layer thickness between 600 – 1200 mm.
Thick-Bedded (Massive)	- Stratified with layer thickness greater than 1200 mm.
Lensed	- Inclusions of small pockets of different soil, such as small lenses of sand material throughout a mass of clay.

Bedding Structures

Cross-bedding	- Internal 'bedding' inclined to the general bedding plane.
Ripple-bedding	- Internal 'wavy bedding'.
Graded-bedding	- Internal gradation of grain size from coarse at base to finer at top of bed.
Horizontal bedded	- Internal bedding is parallel and flat lying.

Secondary Soil Structure (Post-Depositional)

Accretionary Structures

Includes nodules, concretions, crystal aggregates, veinlets, color banding, and:


















Cementation	- Chemically precipitated material, commonly calcite (CaCO_3), binds the grains of soil, usually sandstone. Described as weak, moderate, or strong (ASTM D2488-00).
Salt Crystals	- Groundwater flowing through the soil/rock often precipitates visible amounts of salts. Calcite (CaCO_3), glauber salts ($\text{Na}_2\text{Ca}(\text{SO}_4)_2$), and gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) are common.

Fracture Structures










Fracture	- A break or discontinuity in the soil or rock mass caused by stress exceeding the materials strength.
Joint	- A fracture along which no displacement has occurred.
Fissure	- A gapped fracture, which may open and close seasonally. Usually an extensive network of closely spaced fractures, giving the soil a 'nuggetty' structure.
Slickensides	- Fractures in clay that are slick and glossy in appearance, caused by shear movements.
Brecciated	- Contains randomly orientated angular fragments of a finer mass, usually associated with shear displacement in soils.
Fault	- A fracture or fracture zone along with displacement has occurred.
Blocky	- A cohesive soil that can be broken down into small angular lumps which resist further break down.

Symbols Used on Borehole Logs






Lithology Type

	Clay		Till - oxidized		Coal		Clay Shale
	Silt		Till - unoxidized		Topsoil or Organic Soil		Sandstone
	Sand		Peat		Concrete		Mudstone
	Gravel		Fill (undifferentiated)		Asphalt		Bedrock (undifferentiated)
	Cobbles						



Borehole Completion and Backfill Materials

	Bentonite		Cuttings		Slough
	Concrete		Grout		Solid Pipe
	Cover		Sand		Slotted Pipe

Soil Sample Type

	Thin Walled Tube		Disturbed		No Recovery
	Driven Spoon		Core (any type)		

Groundwater Symbols

	Piezometric elevation as determined by a piezometer installation.
	Water levels measured in borings at time and under the conditions noted.



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APPENDIX E

Heritage Character Statement

FHBRO Number 92-017

Longview, Alberta

Work Horse Barn (Building 17) *FINAL*

Bar U Ranch

The Work Horse Barn at the Bar U Ranch was built after the Saddle Horse Barn, as part of the first group of buildings, between 1883 and 1892. Its exact date of construction is not known. The building has undergone some modifications over the years to meet changing needs, including the addition of a section to its west side for grain storage before 1916 and the installation of a sling for lifting hay into the loft at the south end. The building continues to be used for horse accommodation. The Work Horse Barn is a component of the Bar U Ranch National Historic Site. Parks Canada is the custodian. See FHBRO Building Report 92-17.

Reasons for Designation

The Work Horse Barn, as a component of the Bar U Ranch complex, was designated “Classified” because of the historical associations of this building and the ranch as a whole, because of the exceptional qualities of the site and setting, and because of its functional design and contribution to the overall aesthetic qualities of the complex.

The Bar U Ranch is strongly associated with the development of ranching in Alberta. The Work Horse Barn is associated with this development as the largest and earliest log structures constructed on the site, and is an important component of the Bar U. Constructed between 1883 and 1892, the Work Horse Barn is also associated with George Lane, a prominent Alberta cattleman, who was hired at Bar U in 1884 to serve as the ranch foreman and who ran the ranch between 1902 and 1925. Finally, the Work Horse Barn is associated with Patrick Burns, who purchased the Bar U Ranch in 1927 to add to his vast cattle empire. Burns, who is recognized as the kingpin of the meat processing industry in western Canada during the mid-1920s, has been designated a person of national significance.

A major building on the site, the Work Horse Barn is the product of a simple, function-oriented design and yet has a strong aesthetic impact due to its scale, massing and patina. An excellent example of its type, it served to define this type of working building on a foothills ranch. It is an impressive size for a building of log construction. The moulded concrete veneer, present at the original section’s north façade, replicates a horizontal, round log surface with knots and graining, is a unique feature and has made the building well known throughout the region. The Bar U brand is emblazoned on the east slope of the roof and further raises the building’s profile. The many modifications it has undergone testify to the practical approach of the ranch’s managers and to the flexibility of the buildings themselves.

As part of a cohesive complex of buildings arranged to great functional effect in a simple and beautiful natural setting, the Work Horse Barn contributes significantly to the

character of the Bar U Ranch. The structure is associated with the corral to its east,

The interior of the original section of the Work Horse Barn contains ten standing stalls, two box stalls, a feed room and a tack room. A loft above was used for hay storage

FHBRO Number 92-017

Longview, Alberta

Work Horse Barn (Building 17) *FINAL*

Bar U Ranch

and is located immediately south of the main road and west of the Saddle Horse Barn. It is a component of the historical grouping, within the community centre, that served as the engine of the overall ranch operation. The grouping strongly complements the Pekisko Creek valley grassland and valley ridge on which it is located.

The Work Horse Barn is also a component of the collection of pre-1927 buildings which contribute to the landmark value of the complex as one of the region's most important early ranch sites. This landmark value is reinforced by the designation of the complex as a National Historic Site.

Character Defining Elements

The heritage character of the Work Horse Barn resides in its massing, construction techniques and materials, unique features, exterior finish, interior features and layout and setting.

The Work Horse Barn has two sections: the original two-storey log building with a gabled roof and the one-storey light-frame addition with a shed roof to its west. The walls of the original section consist of round logs with squared dovetail-notched corners. The logs used for the Work Horse Barn are larger in dimension than those used for other buildings on the site. The longitudinal walls are two log-lengths long, and are joined by being mortised into an upright log. The original section rests on a dry-laid sandstone foundation, later reinforced with concrete. The roof is built with pole rafters supported with purlins and queen posts, and it is covered with milled cedar shingles. A projecting peak was added at the south end of the roof ridge when the sling was introduced, to carry and shelter the mechanism. Two unusual features that add character to the building are the Bar U brand, which is stenciled on both roof slopes, and the moulded concrete veneer on the north façade that replicates a log wall. All these features are character-defining and merit protection. Any changes should be predicated on an understanding of the development of the building and its periods of significance.

The shed-roofed addition increased the stable area by approximately one third. This section rests on a concrete foundation. There is no finished floor, instead the area is surfaced with river stone. Its roof consists of light frame wood rafters, supported on one end by the original section's roof rafters, by a stud wall at the opposite end and by an intermediate purlin. The addition's roof is also covered with milled cedar shingles. Remaining interior features merit preservation.

FHBRO Number 92-017

Longview, Alberta

Work Horse Barn (Building 17) FINAL

Bar U Ranch

and is accessed by a small staircase. The addition is divided into three rooms.

Any clues to the Work Horse Barn's evolution should be protected, including evidence of additions and modifications, existing hardware, barn articles, wear marks and patina.

Development should seek to retain the functional quality of the site and respect existing patterns of access and circulation. The relationships of the Work Horse Barn to the Saddle Horse Barn, the corral, the Blacksmith Shop, the main access road and to other structures of the community centre are important to its heritage character and should be protected. Any changes to circulation or access should consider historic patterns related to the movement of pedestrians, horses, grain tanks, wagons and motorized vehicles.

For further guidance, please refer to the *FHBRO Code of Practice*.

2000.03.27

APPENDIX F

Heritage Record Update 2011



WORK HORSE BARN

Bar U Ranch National Historic Site

HERITAGE RECORD
UPDATE 2011

Heritage Conservation Directorate
Heritage Conservation Network
Real Property Branch
Professional and Technical Services Management
Calgary, Alberta

Direction de la conservation du
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Gestion des programmes professionnels et techniques
Calgary, Alberta

GENERAL NOTES:

DUE TO DEFORMATION IN THE STRUCTURE:
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- DIMENSIONS REPRESENT THE DISTANCE AT THAT PARTICULAR
POINT IN THE STRUCTURE, DISTANCES VARY ACCORDING TO
DISTORTION.
- DIMENSIONS GIVEN FOR WINDOW, DOOR AND ALL OTHER
DETAILS ARE AVERAGES OF OPENINGS AND MEMBER SIZES. ALL
COMPONENT SIZES ARE WITHIN 5mm OF DIMENSIONS GIVEN
AND ALL SPACING OR OVERALL DIMENSIONS ARE WITHIN 12mm
IN VARIATION.

EAVE DETAILS, RIDGE DETAILS AND SECTIONS ARE
REPRESENTATIVE AND ARE TYPICAL FOR ALL SIMILAR SITUATIONS.
DIMENSIONS GIVEN ARE GENERAL AS OVERHANGS AND
DISTORTION VARY.

SOME CONJECTURE EXISTS IN SITUATIONS WHERE DUE TO THE
INABILITY TO MEASURE COMPONENTS THAT ARE OBSTRUCTED BY
OTHER COMPONENTS, HIDDEN LINES ARE USED TO INDICATE
MEMBER CONFIGURATION AND PLACEMENT.

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
Revision / Revision				

<div>A B C</div>	A – Detail Number / Numéro de détail B – Detail Location / Empl. du détail C – Sheet Number / Numéro de la feuille	<div>A B C</div>
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Linear dimensions in millimeters Dimensions linéaires en millimètres

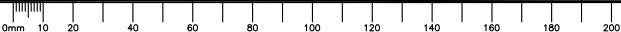
Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur

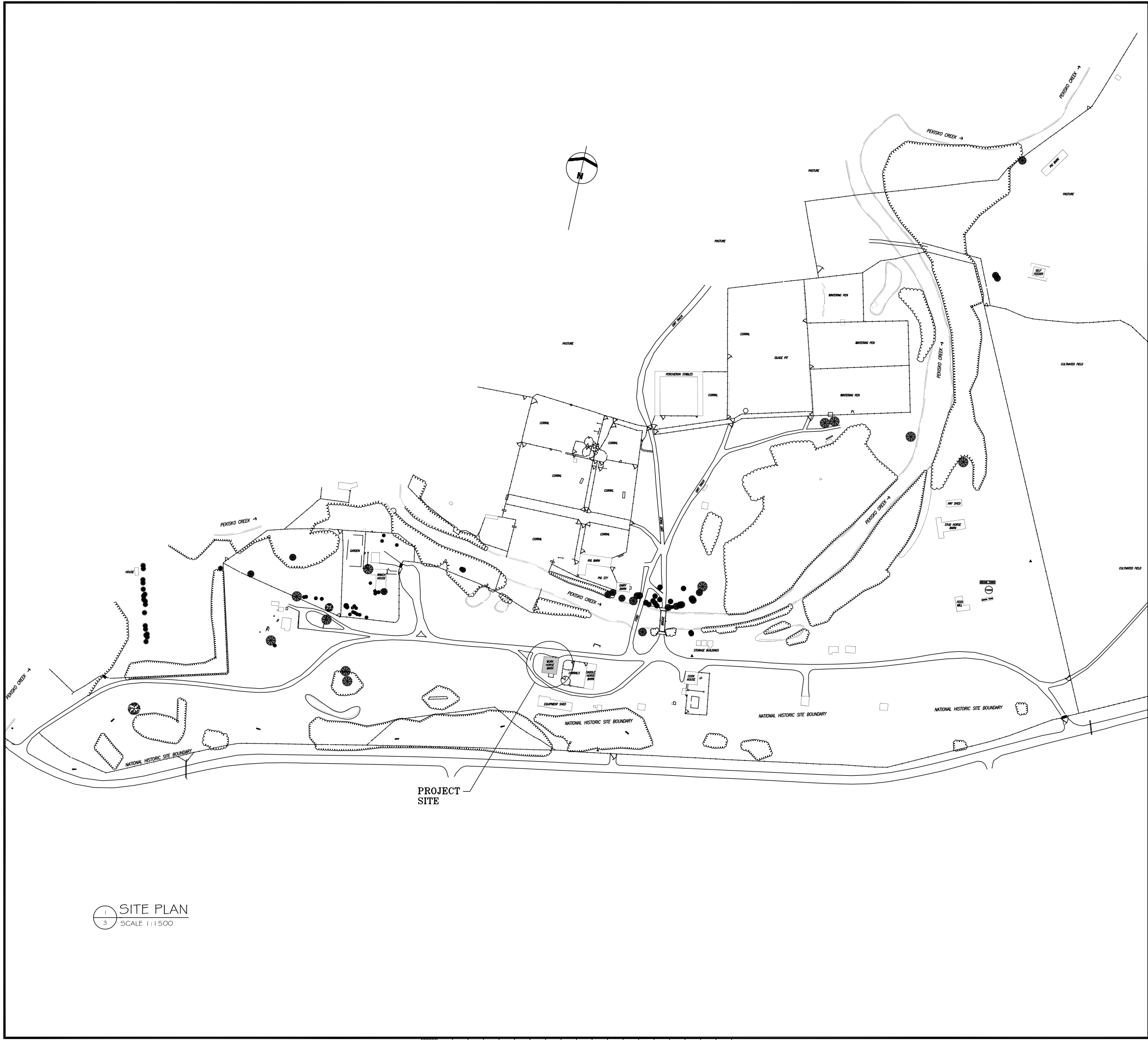
Client / client
PARKS CANADA AGENCY WESTERN REGION

Project Title / Titre du projet
WORKHORSE BARN HERITAGE RECORD UPDATE 2011
Bar U Ranch N.H.S

Drawing Title / Titre du dessin
COVER SHEET

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpenté par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle N.T.S.
Client Acceptance/Acceptation du client		Approved by/Approuvé par
PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE		
Project No./N° du projet R.041811.024	Asset No./N° du bien	Sheet No./de la feuille 1
Reference No./N de référence du dessin R.041811.024		1 of 14





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Revision / Revision				

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C	C - Sheet Number / Numéro de la feuille	C

Linear dimensions in millimeters / Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur
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Client / client

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WESTERN REGION

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WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

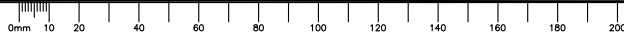
Drawing Title / Titre du dessin

SITE PLAN

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpente par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle 1:1500
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Park Responsible Officer/Agent responsable Project No./N° du projet R.041811.024	Draw A & E SERVICES/GENIE ET ARCHITECTURE Asset No./N° du bien	Date Sheet No./de la feuille 3
Reference No./N de référence du dessin R.041811.024		3 of 14



2
4 MAIN FLOOR PLAN
SCALE 1:30



NOTES:

- 1 CONCRETE FLOOR
2 CONCRETE SLAB w/ BRANDING SYMBOLS (REFER TO PHOTOS)
3 WOOD FLOOR-2 LAYERS(40 THICK x 200-300 WIDE)
4 25 x 180 T & G FLOOR BOARDS
5 SADDLE HOLDERS (REFER TO DETAILS SHEET 11)
6 SADDLE HOLDERS (REFER TO DETAIL SHEET 11)
7 90 Ø WOOD POST
8 120 Ø WOOD POST
9 140 x 120 3 PLY WOOD COLUMN (40 x 140 EA. PLY)
10 150 x 150 SOLID WOOD COLUMN
11 BRIDLE HOLDER (REFER TO DETAILS SHEET 11)
12 TYPICAL HORSE STALLS w/ MANGERS & FEEDERS
13 OPEN WOOD STAIRS-13 RISERS TOTAL 175-95 RISE/195-200 RUN
14 RECTANGULAR HOLES IN FLOOR ASSUMED TO BE LOCATION OF PREVIOUS COLUMNS
15 FEED CONTAINER
16 EXISTING FEEDER
17 EXISTING MANGER
18 HOLES IN LOGS LINED UP VERTICALLY. ASSUMED LOCATION OF ORIGINAL STALLS.
19 PLYWOOD FLOOR (CONSTRUCTION BELOW UNKNOWN)
20 WOOD FLOOR-255-260 WIDE(THICKNESS & LAYERS UNKNOWN)
21 10 PLYWOOD ON CORRIDOR SIDE. 10 BOARD ON SADDLE HOLDER SIDE. WALL STRUCTURE UNKNOWN.
22 EXTERIOR SLIDING DOOR. REFER TO DETAILS 1/A14 & 2/A14.
23 INTERIOR DOOR. REFER TO DETAIL SHEET 12)
24 INTERIOR DOOR. REFER TO DETAIL SHEET 12)
25 EXTERIOR SLIDING DOOR. REFER TO DETAILS SHEET 12)
26 EXTERIOR WINDOW. REFER TO DETAILS SHEET 13)

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Linear dimensions in millimeters
Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil
Engineer's Stamp /
Sceau de l'ingénieur

Client / client

PARKS CANADA AGENCY
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Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

Drawing Title / Titre du dessin

MAIN FLOOR PLAN

Drawn by/Dessiné par
ANITA SEWALL

Surveyed by/Arpenté par
PAT MCFADDEN

Date
DECEMBER 2011

Designed by/Concept par

Reviewed by/Revisé par

Scale/Echelle
1:30

Client Acceptance/Acceptation du client

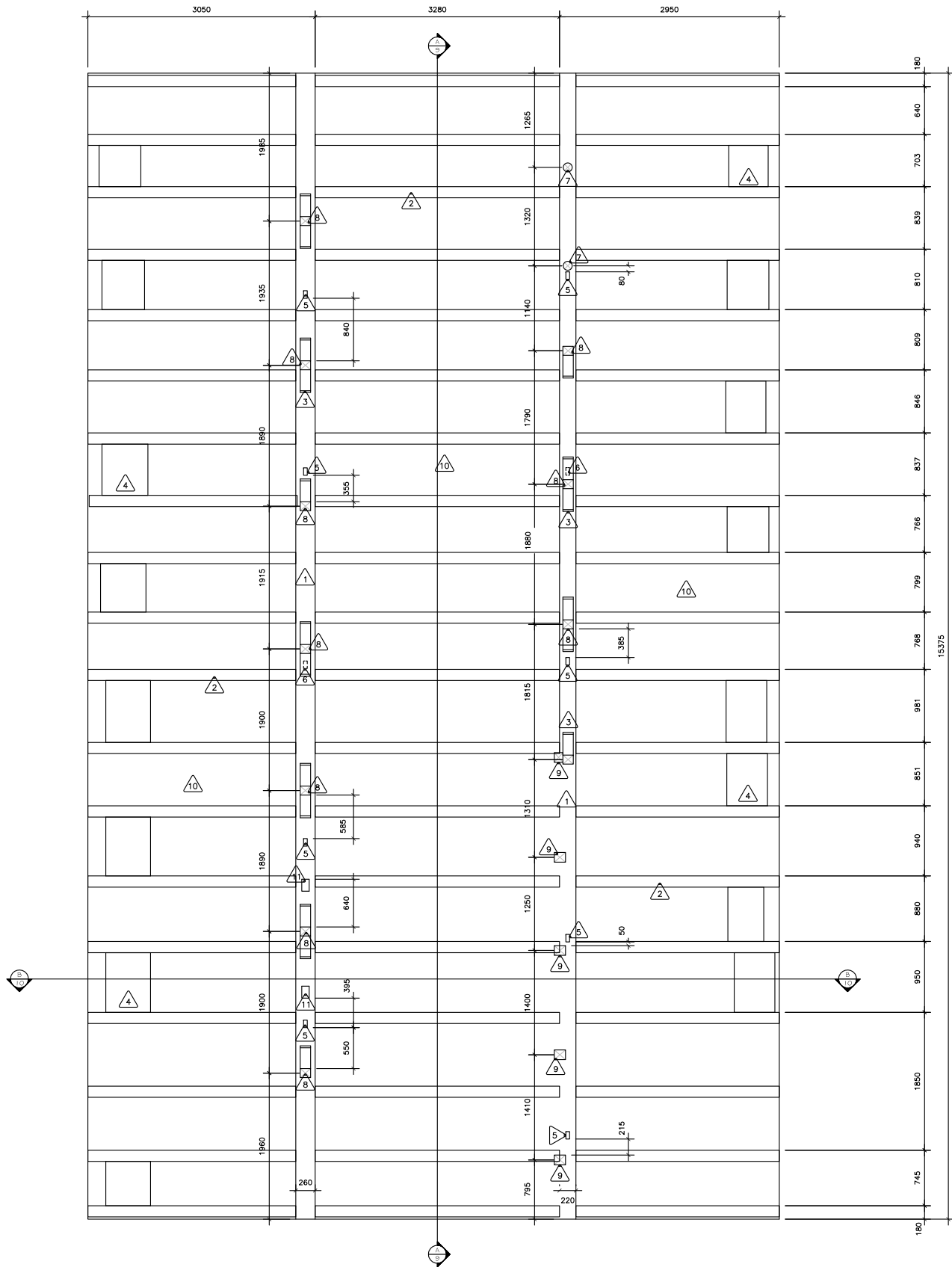
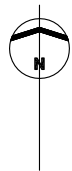
Approved by/Approuvé par

Park Responsible Officer/AGENT RESPONSABLE
Project No./N° du projet
R.041811.024

Asset No./N° du bien

Sheet No./de
la feuille
4

Reference No./N° de référence du dessin
R.041811.024



REFLECTED CEILING PLAN
SCALE 1:30

NOTES:

- 1 TYPICAL WOOD BEAM—HEWN TOP & BOTTOM
- 2 TYPICAL WOOD JOISTS—HEWN TOP & BOTTOM WIDTHS VARY—AVERAGE SIZE 150
- 3 TYPICAL 40 x 140 UNFINISHED WOOD BRACING
- 4 LINE OF HATCHES FROM LOFT. REFER TO DETAIL SHEET 11
- 5 50 x 100 NOTCHES ALIGN w/ HOLES IN LOGS. ASSUMED LOCATION OF ORIGINAL STALLS. NOTE: AT SOME LOCATIONS, HOLES ARE NOT READILY VISIBLE.
- 6 ASSUMED LOCATION OF 50 x 100 NOTCHES.
- 7 120 Ø WOOD POST
- 8 140 x 120 3 PLY WOOD COLUMN
- 9 150 x 150 SOLID WOOD COLUMN
- 10 20 x 140 PLAIN BOARDS w/ 20 x 170 SHIPLAP BOARDS ON TOP. BOARDS RUN PERPENDICULAR TO JOISTS.
- 11 100 x 160 NOTCHES. ASSUMED PREVIOUS COLUMN LOCATION.

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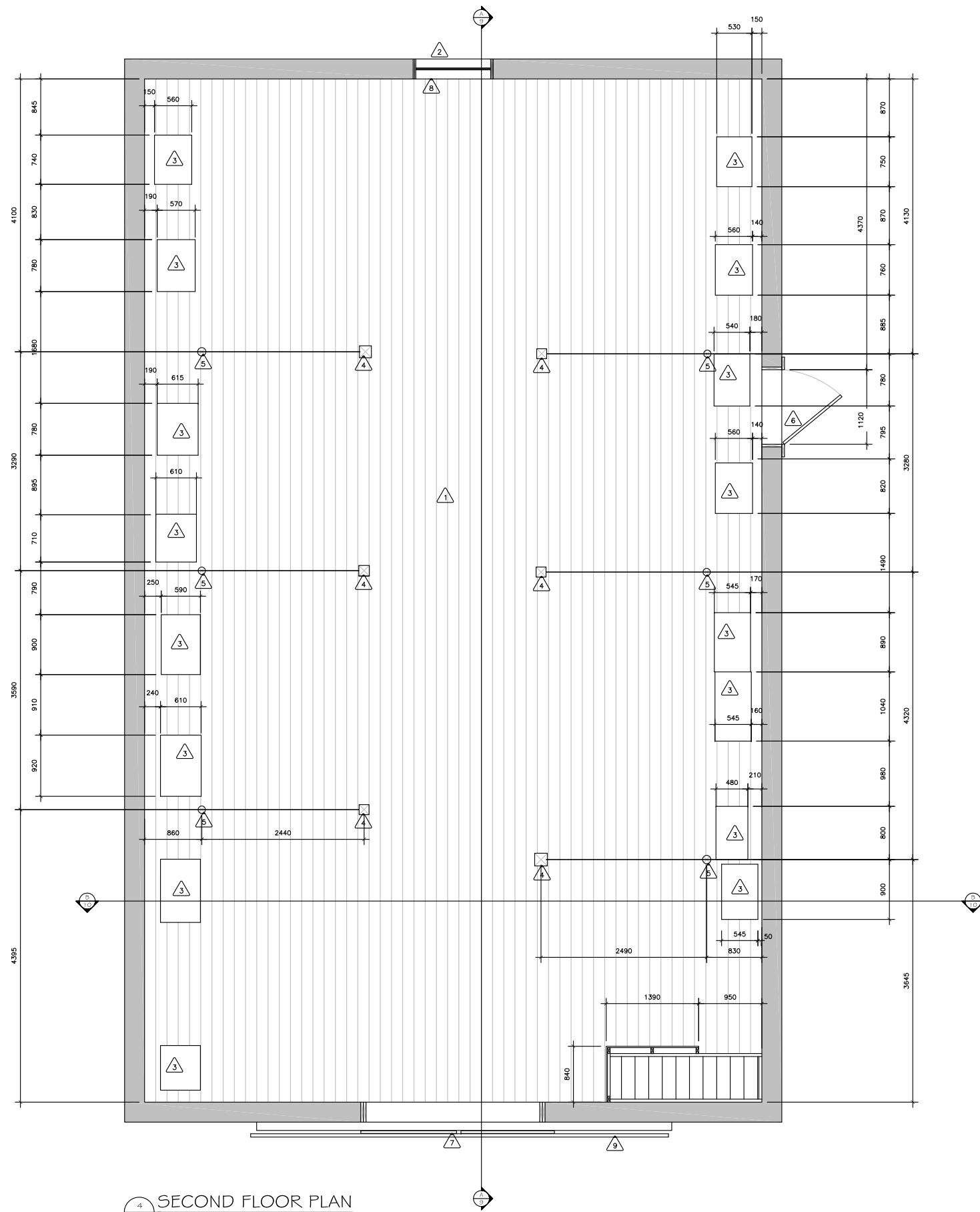
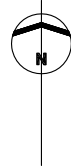
Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur
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PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet
WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011
Bar U Ranch N.H.S

Drawing Title / Titre du dessin
REFLECTED CEILING PLAN

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpenté par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle 1:30
Client Acceptance/Acceptation du client / Approved by/Approuvé par		
Park Responsible Officer/AGENT RESPONSABLE	Don	A & E SERVICES/GENIE ET ARCHITECTURE
Project No./N° du projet R.041811.024	Asset No./N° du bien	Sheet No./de la feuille 5
Reference No./N de référence du dessin R.041811.024		5 of 14



4
6 SECOND FLOOR PLAN
SCALE 1:30

NOTES:

- 1 20 x 170 SHIPLAP BOARDS (55) ON 20 x 140 PLAIN BOARDS.
- 2 WINDOW SHOWN IN PLAN FOR LOCATION PURPOSES ONLY.
- 3 TYPICAL HATCHES TO HORSES STALLS REFER TO DETAIL SHEET 11
- 4 WOOD COLUMNS (RANGE 140–150 x 180–230)
- 5 ROUND COLUMN SUPPORT POSTS (RANGE 110–125*)
- 6 LOFT DOOR (SWINGING ON HINGES) REFER TO DETAILS SHEET 13
- 7 LOFT DOORS c/w METAL TRACK
- 8 40 x 140 STUDS BELOW TOP LOG. POSSIBLE LOCATION OF PREVIOUS OPENING.
- 9 50 # METAL PIPE

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Linear dimensions in millimeters
Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur
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Client / client
PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet
WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011
Bar U Ranch N.H.S

Drawing Title / Titre du dessin
SECOND FLOOR PLAN

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpenté par PAT MCFADDEN	Date DECEMBER 2011
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PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE	DATE	A & E SERVICES/GENIE ET ARCHITECTURE	DATE
Project No./N° du projet R.041811.024	Asset No./N° du bien	Sheet No./de la feuille 6	Reference No./N° de référence du dessin R.041811.024

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Linear dimensions in millimeters Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur
Client / client	

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

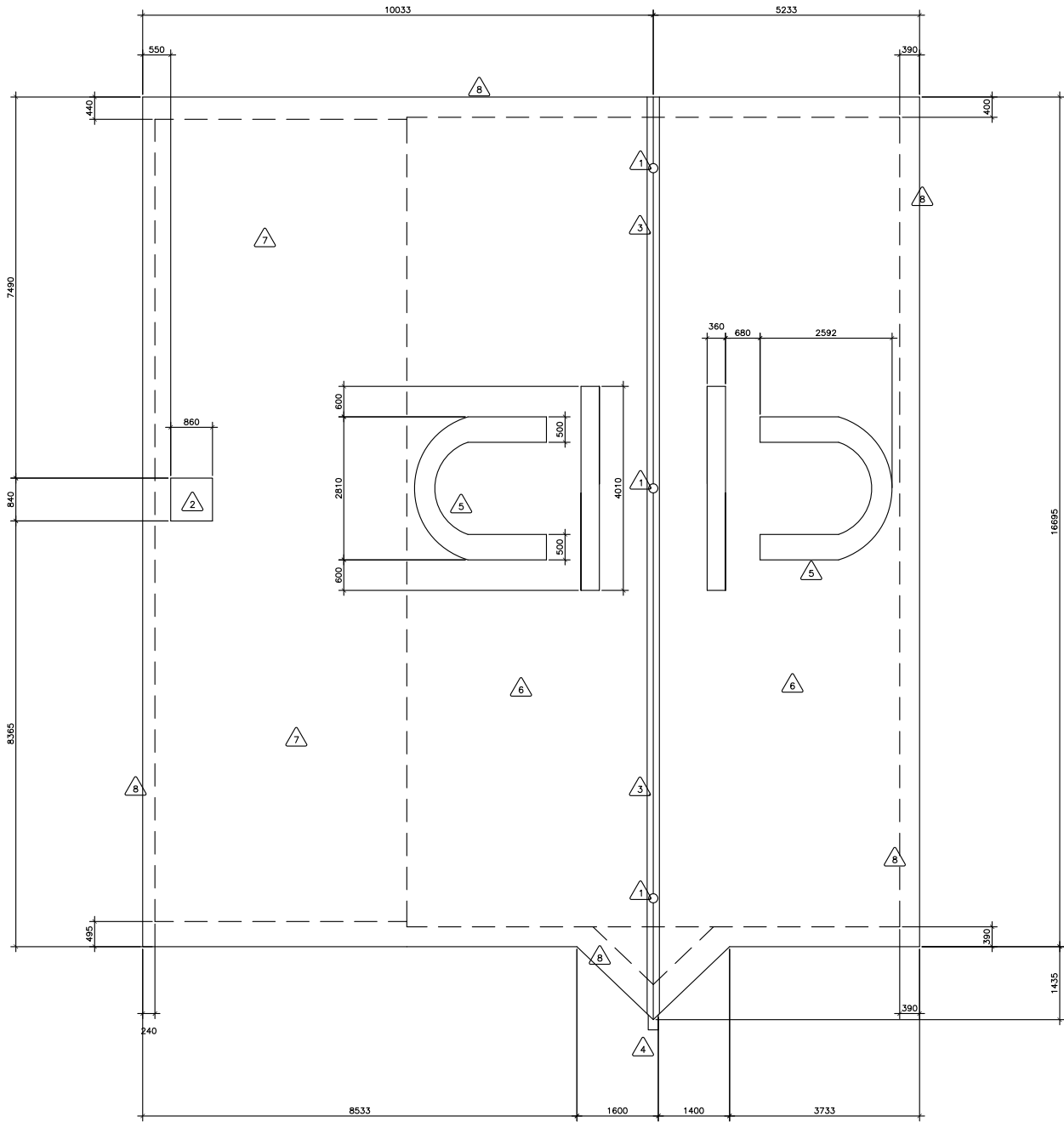
Drawing Title / Titre du dessin

ROOF PLAN

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpente par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle 1:50

Client Acceptance/Acceptation du client Approved by/Approuvé par

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Project No./No du projet R.041811.024	Asset No./No du bien	Sheet No./de la feuille 7	Reference No./N de reference du dessin R.041811.024



5 ROOF PLAN
7 SCALE 1:50

NOTES:

- 1

LIGHTNING RODS
- 2

ROOF HATCH C/W 7 COURSES OF SHINGLES,
120 EXPOSURE, 450 LENGTH – SEE DETAIL THIS SHEET
- 3

RIDGE BOARD – 20 X 120 SHIPLAP
- 4

METAL HAY FORK EXTENDS THROUGH
- 5

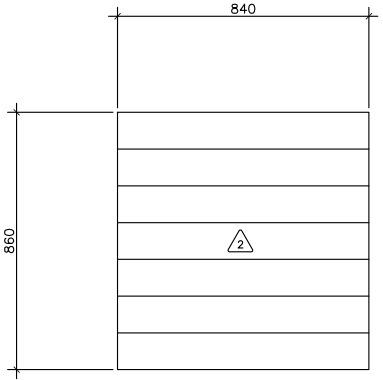
PAINTED BAR–U SYMBOL
- 6

MAIN BARN – 51 SHINGLE COURSE – 120 EXPOSURE, 450 LENGTH
- 7

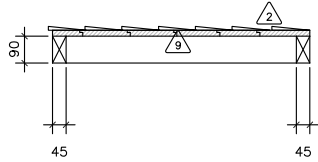
SHED – 46 SHINGLE COURSES, 120 EXPOSURE, 450 TOTAL
- 8

ROOF OVERHANG VARIES
- 9

6–20 x 60–155 SHIPLAP BOARDS



PLAN VIEW



TYPICAL SECTION

6 HATCH COVER DETAIL
7 SCALE 1:10

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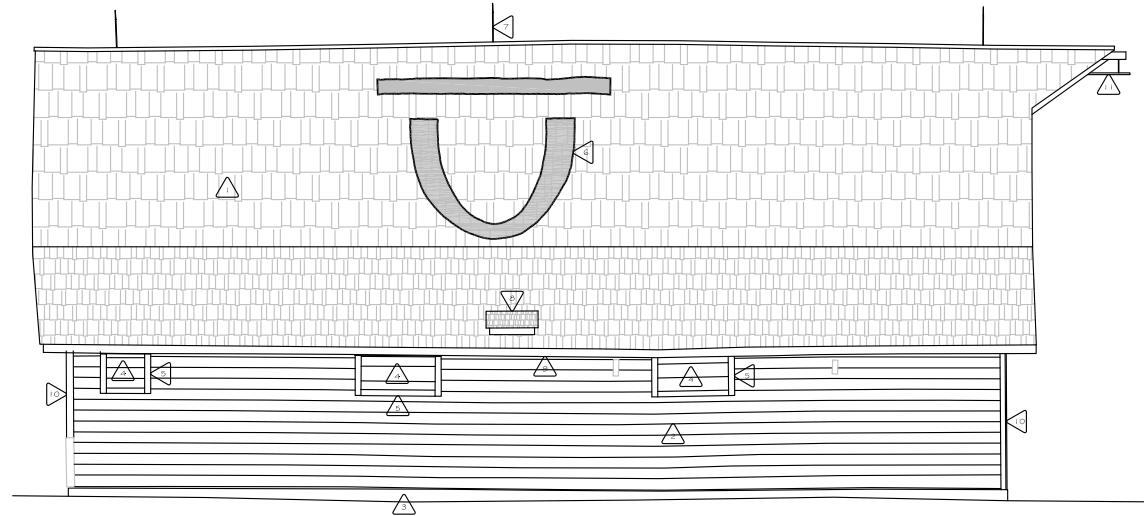
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Direction générale des biens immobiliers
Gestion des programmes professionnels et techniques
Calgary, Alberta

GENERAL NOTES:

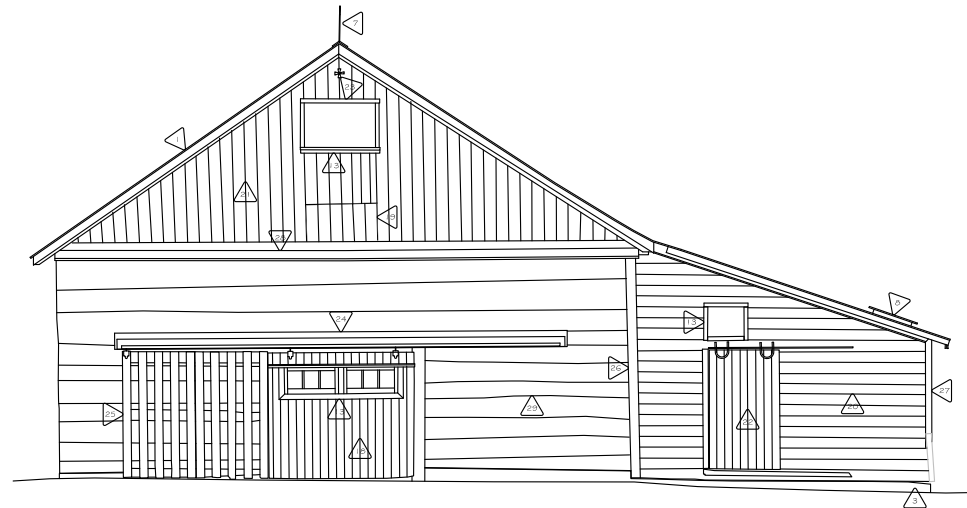
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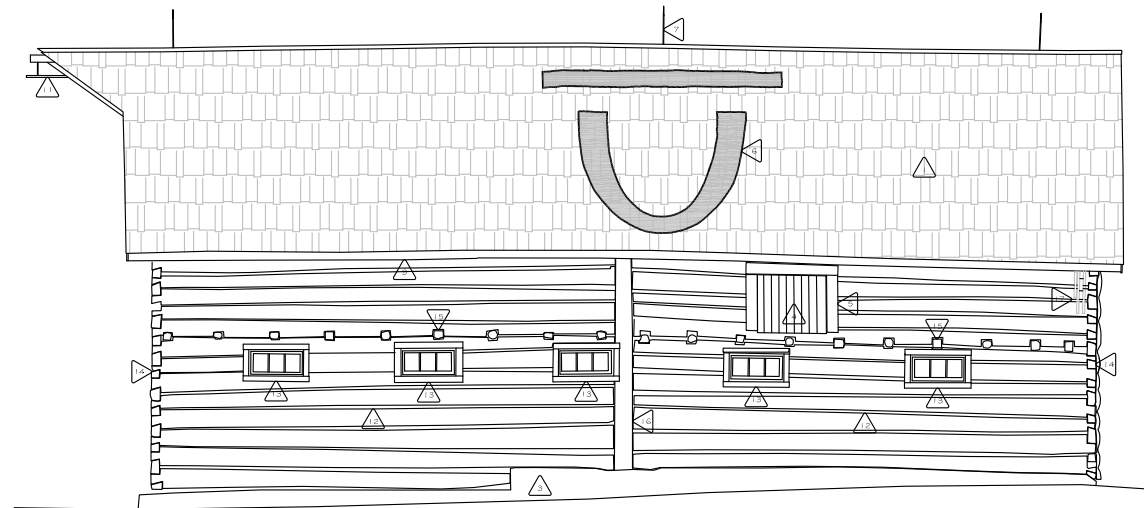
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7 WEST ELEVATION
SCALE 1:50



8 NORTH ELEVATION
SCALE 1:50



9 EAST ELEVATION
SCALE 1:50



10 SOUTH ELEVATION
SCALE 1:50

NOTES:

- 1 TYPICAL WOOD SHINGLE, 120 EXPOSURE, 450 LENGTH
2 HORIZONTAL SHIPLAP SIDING, 13 COURSES @ APPROX. 180 PTD. RED
3 SANDSTONE & CONCRETE FOUNDATION, PTD. RED
4 T & G BOARDS W/ VARYING WIDTHS, PTD. RED
5 DOOR FRAME - 20 x 100 BOARDS & LATCHES, PTD. WHITE
6 BAR U SYMBOL PTD. ON SHINGLES, PAINT FADED ORIGINAL COLOR UNKNOWN
7 LIGHTNING ROD
8 ROOF HATCH c/w TYP. WOOD SHINGLES - SEE SHEET 7 FOR DETAIL
9 15 x 135 FASCSIA BOARD PTD. WHITE
10 20 x 90 TRIM BOARD, PTD. WHITE

- 11 TRACK & BEAM FOR HAY FORK, BEAM PTD. RED
12 ROUGH HEWN LOGS c/w DOVETAIL NOTCHING, PTD. RED
13 WINDOWS COVERED WITH WEATHERPROOFING, ORIGINAL FRAMING BEHIND, PTD. WHITE
14 DOVETAIL NOTCHING, PTD. WHITE
15 TYPICAL LOG CEILING JOIST ENDS, PTD. RED
16 WOOD COLUMN, PTD. RED
17 ORIGINAL PULLEY
18 BARN DOOR-19 BOARDS @ 130, PTD. RED
19 BOARD PATCH, POSSIBLE ORIGINAL OPENING SIZE
20 HORIZONTAL SHIPLAP SIDING, 21 COURSES @ APPROX. 180 PTD. RED

- 21 VERTICAL WOOD SIDING - APPROX. 51 COURSES @ 190-225, PTD. RED
22 SHED DOOR - 10 T & G BOARDS @ 125 c/w METAL TRACK & 2 BRACKETS, PTD. RED
23 CROSS CUTOOT IN VERTICAL BOARD
24 METAL DOOR TRACK AND FACE BOARD, PTD. WHITE
25 OPEN FRAME DOOR ON METAL TRACK, 20 x 170 TRIM BOARD, PTD. RED
26 20 x 170 TRIM BOARD, PTD. WHITE
27 20 x 100 TRIM BOARD, PTD. WHITE
28 20 x 290 ± WOOD TRIM BOARD ON 45 x 90 ± ANGLED DRIP CAP, 20 x 170 TRIM BOARD, PTD. RED
29 CEMENTITIOUS PARGING c/w FAUX LOG PATTERN, 20 x 170 TRIM BOARD, PTD. RED
30 HORIZONTAL SHIPLAP SIDING, 21 COURSES @ APPROX. 180 PTD. RED

- 31 VERTICAL WOOD SIDING - APPROX. 17 COURSES @ 190-225, PTD. RED
32 LOFT DOOR - 11 T & G BOARDS @ 120-140, PTD. RED
33 50 x 290 ± WOOD DRIP CAP c/w 50 x 90 ANGLED BRACING, FLASHING & METAL DOOR TRACK
34 60 # METAL PIPE DOOR GUIDE, PTD. RED
35 20mm THICK PLYWOOD PATCH ON DOOR
36 20 x 90 x 710 WOOD BOARDS, PTD. RED
37 WOOD LOFT DOOR STOP, PTD. RED
38 20 x 90 - 100 WOOD TRIM BOARD, PTD. WHITE



No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
Revision / Revision				

A	A - Detail Number / Numéro de détail	A
B	B - Detail Location / Empl. du détail	B
C	C - Sheet Number / Numéro de la feuille	C

Linear dimensions in millimeters
Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil
Engineer's Stamp /
Sceau de l'ingénieur

Client / client

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

Drawing Title / Titre du dessin

ELEVATIONS

Drawn by/Dessiné par
ANITA SEWALL

Surveyed by/Arpenté par
PAT MCFADDEN

Date
DECEMBER 2011

Designed by/Concept par
Reviewed by/Revisé par

Scale/Echelle
1:50

Client Acceptance/Acceptation du client
Approved by/Approuvé par

Park Responsible Officer/Agent responsable
Project No./N° du projet

R.041811.024

Asset No./N° du bien

Sheet No./de
la feuille

Reference No./N° de référence du dessin

R.041811.024

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Heritage Conservation Directorate

Heritage Conservation Network
Real Property Branch
Professional and Technical Services Management
Calgary, Alberta

Direction de la conservation du
patrimoine

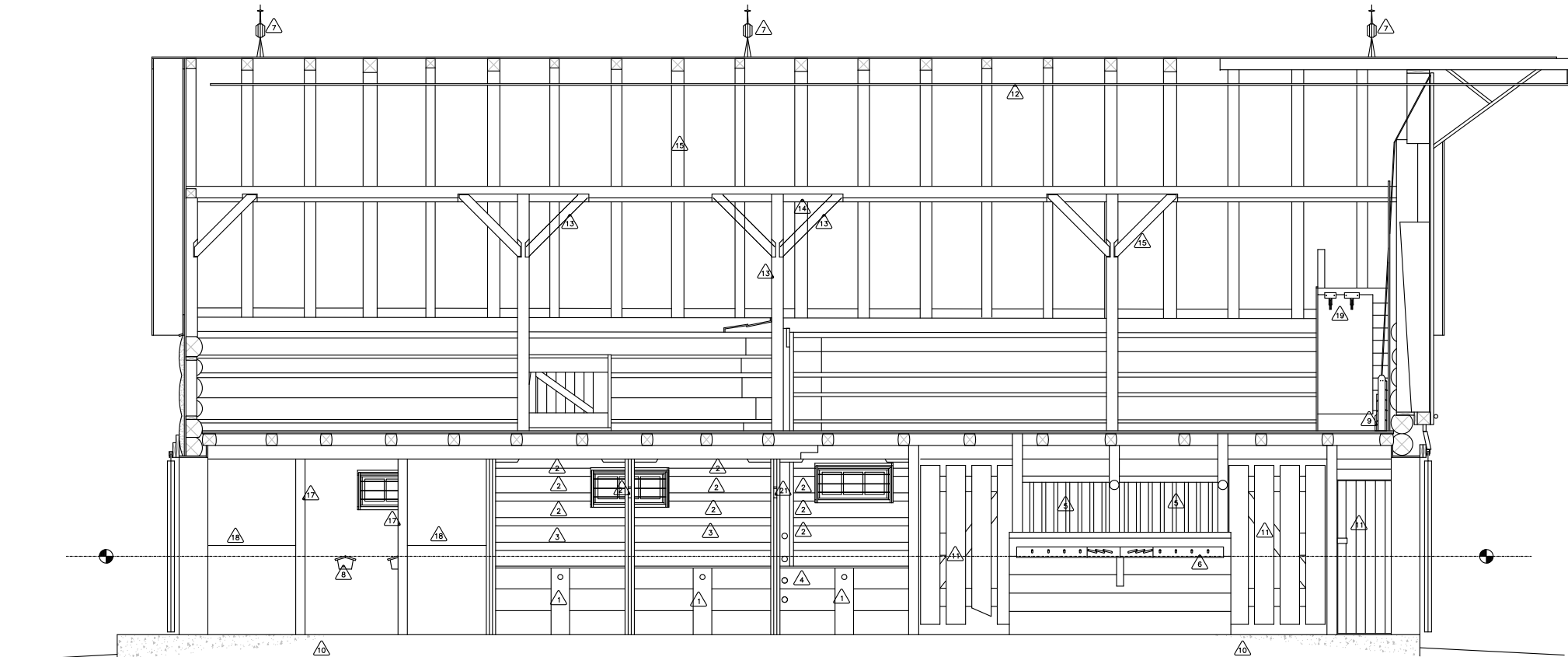
Heritage Conservation Network
Direction générale des biens immobiliers
Gestion des programmes professionnels et techniques
Calgary, Alberta

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A-A
9
LONGITUDINAL SECTION
SCALE 1:30

NOTES:

- △1 WOOD STALLS, MANGERS & COLUMNS, UNFINISHED
△2 ROUGH HEWN LOGS, PTD. WHITE
△3 ROUGH HEWN LOGS, UNFINISHED
△4 HOLES IN EXTERIOR WALL INDICATES LOCATIONS
OF ORIGINAL STALLS. NOTE: SOME HOLES ARE
NOT READILY VISIBLE; NOTCHES ON u/s OF BEAMS
ALSO INDICATE ORIG. STALL LOCATION.
△5 50 # METAL BARS
△6 BRIDLE HOLDER, PTD. BLACK
REFER TO DETAILS SHEET 11
△7 LIGHTNING ROD
△8 SADDLE HOLDER, PTD. WHITE
△9 COUNTER WEIGHT FOR LOFT DOORS
REFER TO DETAILS SHEET 11

- △10 CONCRETE FLOOR
△11 DOORS, PTD. WHITE
△12 TRACK FOR HAY FORK IS HOOKED ONTO HORSESHOES
ATTACHED TO RAFTER JOISTS
△13 COLUMN-HEWNED & NOTCHED FOR WOOD BRACING
△14 BEAM-HEWNED & NOTCHED FOR COLUMNS & BRACING
△15 WOOD BRACING
△16 RAFTER JOISTS-HEWNED TOP & SIDES, WIDTHS VARY
△17 COLUMNS, PTD. BROWN
△18 WALL, PTD. BROWN FROM GROUND TO 140 ABOVE DATUM,
ABOVE PTD. WHITE
△19 8 PLYWOOD c/w 2 METAL PULLEYS
△20 MISSING WOOD BRACING
△21 HARNESS HOLDER. REFER TO DETAILS SHEET 11

0mm 10 20 40 60 80 100 120 140 160 180 200

No.	Date	Description	Drawn by Dessine par	Approved Approuvé
Revision / Revision				

A C	A - Detail Number / Numéro de détail B - Detail Location / Empl. du détail C - Sheet Number / Numéro de la feuille	A B C
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Linear dimensions in millimeters
Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil
Engineer's Stamp /
Sceau de l'ingénieur

Client / client

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

Drawing Title / Titre du dessin

BUILDING SECTION A-A

Drawn by/Dessine par ANITA SEWALL	Surveyed by/Arpente par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle 1:30

Client Acceptance/Acceptation du client
Approved by/Approuvé par

Park Responsible Officer/Agent Responsable
A & E Services/Genie et Architecture

Project No./N° du projet
R.041811.024

Asset No./N° du bien

Sheet No./de
la feuille
9

Reference No./N de reference du dessin
R.041811.024

9 of 14

Heritage Conservation Directorate

Heritage Conservation Network
Real Property Branch
Professional and Technical Services Management
Calgary, Alberta

Direction de la conservation du
patrimoine

Heritage Conservation Network
Direction générale des biens immobiliers
Gestion des programmes professionnels et techniques
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B-B
10 TRAVERSE SECTION
SCALE 1:25

NOTES:

- 1 DOOR FRAME, PTD. RED
2 ROUGH HEWN LOGS, PTD. WHITE
3 ROUGH HEWN LOGS, UNFINISHED
4 25 x 170-250 VERT. WOOD BOARDS, PTD. WHITE
5 INTERIOR OF DOOR UNPAINTED
6 BRIDLE HOLDER, PTD. BLACK
REFER TO DETAILS SHEET 11
7 LIGHTNING ROD
8 25 x 230-290 HORIZ. WOOD BOARDS,
PTD. WHITE
9 25 x 240 HORIZ. WOOD BOARDS,
PTD. BROWN

- 10 CONCRETE FLOOR
11 TYPICAL MANGER & FEEDER. MANGER IS OPEN
BELOW BETWEEN STALLS
12 TRACK FOR HAY FORK
13 WOOD FLOOR-2 LAYERS(40 THICK x 200-300 WIDE)
14 TYPICAL COUNTER WEIGHT FOR LOFT DOORS
15 BEAM-HEWNED & NOTCHED FOR COLUMNS & BRACING
16 RAFTER JOISTS-HEWNED TOP & SIDES
17 WOOD FLOOR - 255-260 WIDE (THICKNESS &
LAYERS UNKNOWN).
18 16 HORIZ. BOARDS - 20 x 175
19 25 x 180 T & G FLOOR BOARDS

0mm 10 20 40 60 80 100 120 140 160 180 200

No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
Revision / Revision				

A	A - Detail Number / Numéro de détail	A
B	B - Detail Location / Empl. du détail	B
C	C - Sheet Number / Numéro de la feuille	C

Linear dimensions in millimeters
Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur
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Client / client

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

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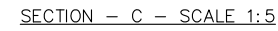
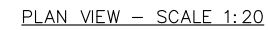
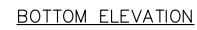
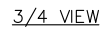
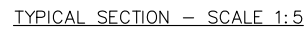
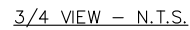
Drawing Title / Titre du dessin

BUILDING SECTION B-B

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpenté par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle 1:25

Client Acceptance/Acceptation du client Approved by/Approuvé par

PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE	DATE	A & E SERVICES/GENIE ET ARCHITECTURE	DATE
Project No./N° du projet R.041811.024	Asset No./N° du bien	Sheet No./de la feuille 10	Reference No./N° de référence du dessin R.041811.024





1	20 WOOD BOARDS PTD. WHITE
2	130# WOOD SADDLE HOLDER
3	40 x 90 WOOD BRACE
4	40 x 180 WOOD BACKING
5	20# WOOD RODS
6	35 x 90 WOOD BRACE
7	ROUGH—HEWN WOOD BEAM
8	3 PLY WOOD COLUMN
9	40 x 140 WOOD BRACING
10	20 THICK HARNESS HOLDER
11	SHIPLAP BOARDS (DIM. AS SHOWN)
12	STEEL CABLE FOR PULLEY
13	CANVAS PULL STRAP
14	CANVAS HINGES
15	20 THICK WOOD BLOCKING
16	20 THICK PLAIN BOARDS

Heritage Conservation Directorate

Direction de la conservation du

Heritage Conservation Network
Direction générale des biens immobiliers

Revision / Revision

	A - Detail Number / Numero de detail	
	B - Detail Location / Empl. du detail	
	C - Sheet Number / Numero de la feuille	

Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp /
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PARKS CANADA AGENCY
WESTERN REGION

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

MISC DETAILS

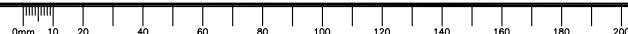
Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpenté par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle AS SHOWN

Client Acceptance/Acceptation du client	Approved by/Approuvé par
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PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE		A & E SERVICES/GENIE ET ARCHITECTURE	
Date		Date	
Project No./N° du projet	Asset No./N° du bien	Sheet No./de	

R.041811.024		la feuille
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No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
Revision / Revision				

<div>A</div> <div>B</div> <div>C</div>	A - Detail Number / Numéro de détail B - Detail Location / Empl. du détail C - Sheet Number / Numéro de la feuille	<div>A</div> <div>B</div> <div>C</div>
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Linear dimensions in millimeters
Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil	Engineer's Stamp / Sceau de l'ingénieur
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Client / client

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

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Drawing Title / Titre du dessin

DOOR DETAILS

Drawn by/Dessiné par ANITA SEWALL	Surveyed by/Arpenté par PAT MCFADDEN	Date DECEMBER 2011
Designed by/Concept par	Reviewed by/Revisé par	Scale/Echelle 1:20

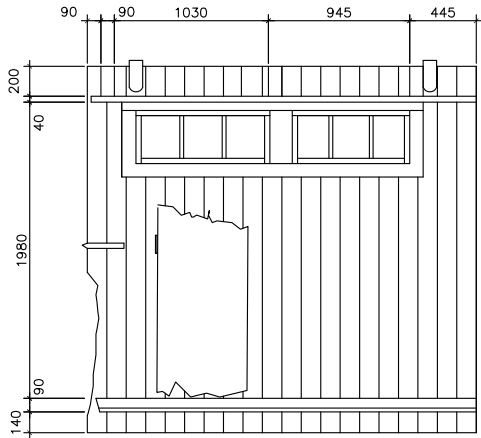
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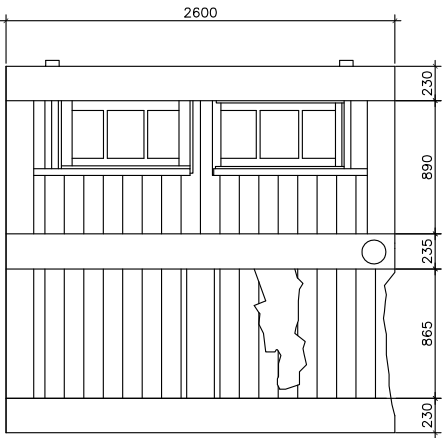
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Project No./N° du projet R.041811.024	Asset No./N° du bien	Sheet No./de la feuille 12	Reference No./N° de référence du dessin R.041811.024

NOTES:

- 19 – 20 x 130 T & G BOARDS
- PLYWOOD SHEET COVERING HOLE IN DOOR
- HOLE IN DOOR
- WINDOW IN DOOR. REFER TO DETAILS SHEET 13
- 40 x 80 ANGLED (10°) DRIP CAP
- METAL DOOR LATCH
- METAL DOOR PULL
- 6 – 20 x 105–145 T & G BOARDS
- 45 THICK PLAIN BOARDS
- METAL HINGES
- 40 x 290 PLAIN WOOD BOARD
- 40 x 190 PLAIN WOOD BOARD
- 65 HIGH x 50 DEEP METAL DOOR TRACK
- 10 – 20 x 140 PLAIN WOOD BOARDS
- 20 x 190 PLAIN WOOD BOARDS

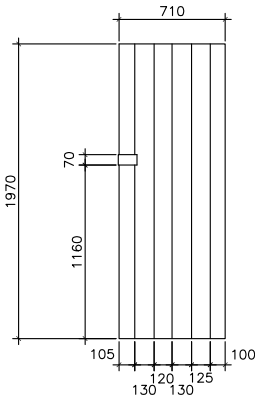


EXTERIOR ELEVATION

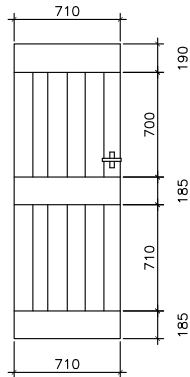


INTERIOR ELEVATION

17
12 SLIDING DOOR - SOUTH ELEVATION
SCALE 1:20

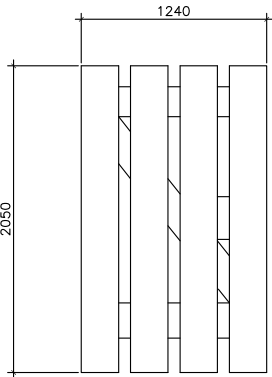


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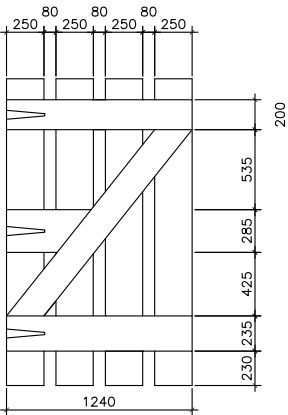


INTERIOR ELEVATION

18
12 INTERIOR DOOR
SCALE 1:20

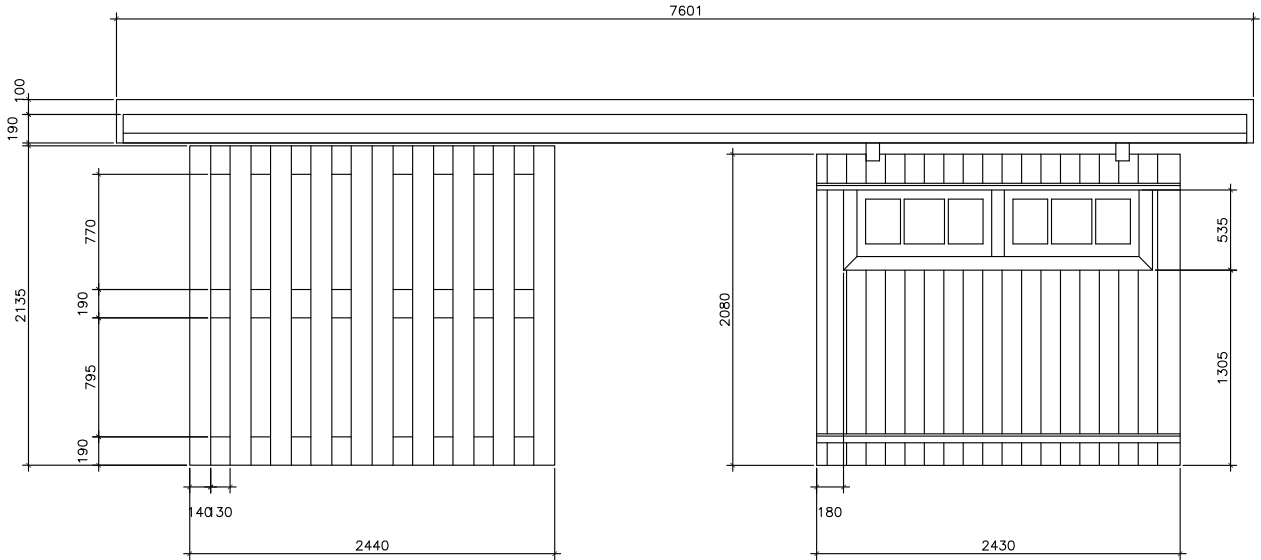


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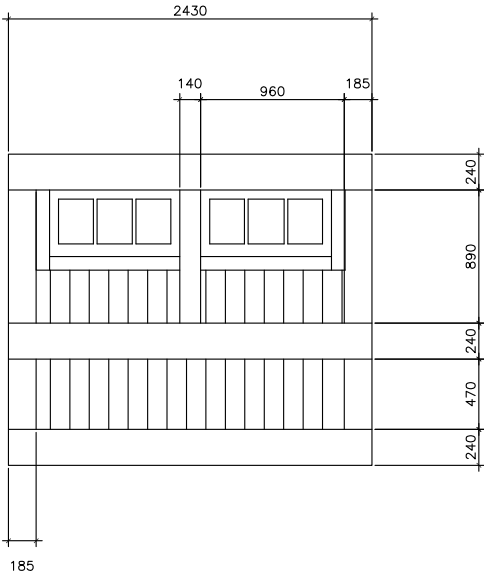


INTERIOR ELEVATION

19
12 TYPICAL STALL DOOR
SCALE 1:20



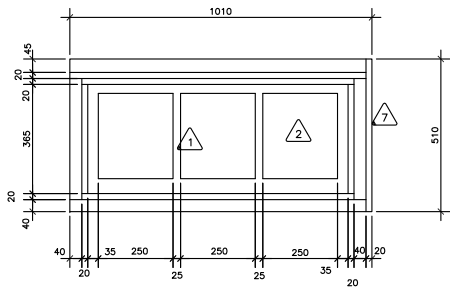
EXTERIOR ELEVATION



INTERIOR ELEVATION

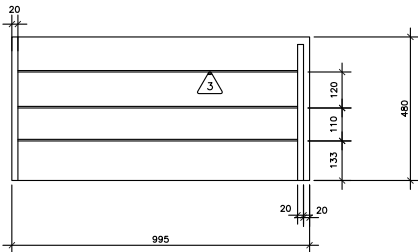
20
12 SLIDING DOOR - NORTH ELEVATION
SCALE 1:20



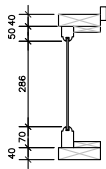


INTERIOR ELEVATION

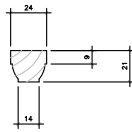
21
13 TYPICAL WINDOW
SCALE 1:10



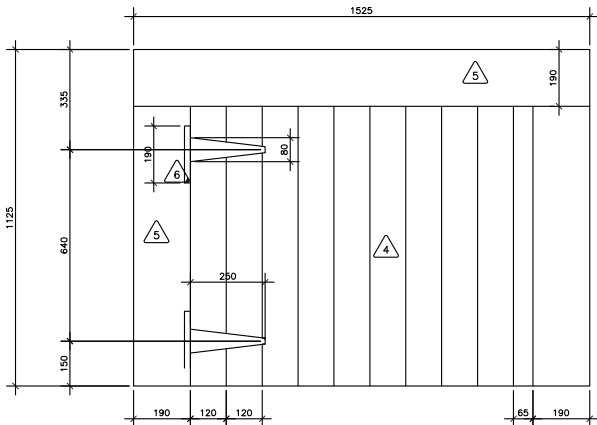
INTERIOR WINDOW BARS ELEVATION



TYPICAL VERTICAL SECTION

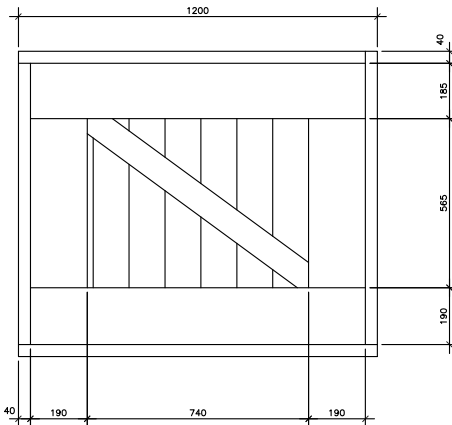


TYPICAL MUNTIN PROFILE



EXTERIOR ELEVATION

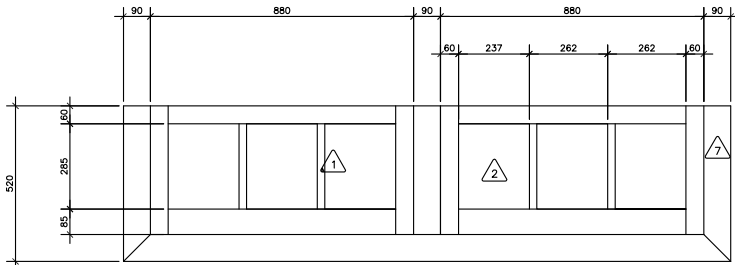
22
13 WEST LOFT DOOR
SCALE 1:10



INTERIOR ELEVATION

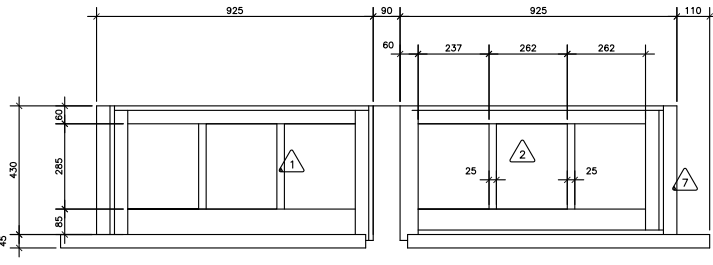
NOTES:

- 1 TYPICAL WINDOW MULLION – SEE PROFILE
2 CLEAR FLOAT GLASS (APPROX. THICKNESS=10mm)
3 10# METAL BARS
4 9 – 20 x 120 PLAIN WOOD BOARDS.
10th BOARD APPROX. 65.
5 25 THICK FRAME
6 METAL HINGES
7 WOOD WINDOW FRAMING

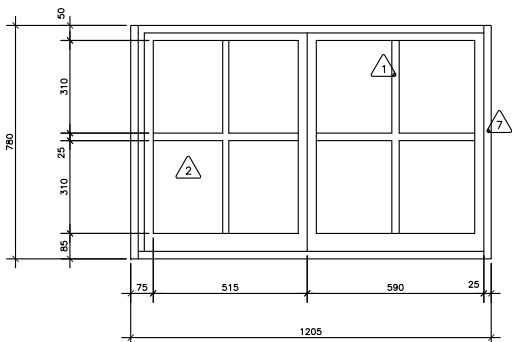


EXTERIOR ELEVATION

23
13 TYPICAL WINDOW IN DOOR LEAF
SCALE 1:10

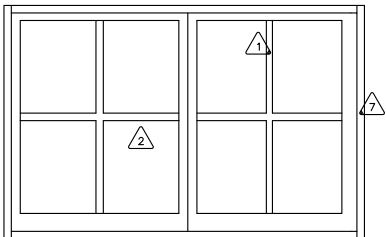


INTERIOR ELEVATION



INTERIOR ELEVATION

24
13 TYPICAL LOFT WINDOW
SCALE 1:10



EXTERIOR ELEVATION

Heritage Conservation Directorate

Heritage Conservation Network
Real Property Branch
Professional and Technical Services Management
Calgary, Alberta

Direction de la conservation du patrimoine

Heritage Conservation Network
Direction generale des biens immobiliers
Gestion des programmes professionnels et techniques
Calgary, Alberta

GENERAL NOTES

DUE TO DEFORMATION IN THE STRUCTURE:
- ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO THE SITE PRIOR TO THE REPLACEMENT OF COMPONENTS.
- DIMENSIONS REPRESENT THE DISTANCE AT THAT PARTICULAR POINT IN THE STRUCTURE, DISTANCES VARY ACCORDING TO DISTORTION.
- DIMENSIONS GIVEN FOR WINDOW, DOOR AND ALL OTHER DETAILS ARE AVERAGES OF OPENINGS AND MEMBER SIZES. ALL COMPONENT SIZES ARE WITHIN 5mm OF DIMENSIONS GIVEN AND ALL SPACING OR OVERALL DIMENSIONS ARE WITHIN 12mm IN VARIATION.

EAVE DETAILS, RIDGE DETAILS AND SECTIONS ARE REPRESENTATIVE AND ARE TYPICAL FOR ALL SIMILAR SITUATIONS, DIMENSIONS GIVEN ARE GENERAL AS OVERHANGS AND DISTORTION VARY.

SOME CONJECTURE EXISTS IN SITUATIONS WHERE DUE TO THE INABILITY TO MEASURE COMPONENTS THAT ARE OBSTRUCTED BY OTHER COMPONENTS, HIDDEN LINES ARE USED TO INDICATE MEMBER CONFIGURATION AND PLACEMENT.

No.	Date	Description	Drawn by Dessine par	Approved Approuve
Revision / Revision				

A	A – Detail Number / Numero de detail	A
B	B – Detail Location / Empl. du detail	B
C	C – Sheet Number / Numero de la feuille	C

Linear dimensions in millimeters
Dimensions lineaires en millimeters

Consultant's Name / Nom de l'expert-conseil
Engineer's Stamp /
Sceau de l'ingenieur

Client / client

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

Drawing Title / Titre du dessin

WINDOW DETAILS

Drawn by/Dessine par
ANITA SEWALL

Surveyed by/Arpente par
PAT MCFADDEN

Date
DECEMBER 2011

Designed by/Concept par

Reviewed by/Reviser par

Scale/Echelle
1:10

Client Acceptance/Acceptation du client

Approved by/Approuve par

PARK RESPONSIBLE OFFICER/AGENT RESPONSABLE
Project No./No du projet
R.041811.024

Asses No./No du-bien

Sheet No./de la feuille
13

Reference No./N de reference du dessin
R.041811.024

13 of 14

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No.	Date	Description	Drawn by Dessiné par	Approved Approuvé
Revision / Revision				

A	A - Detail Number / Numéro de détail	A
B	B - Detail Location / Empl. du détail	B
C	C - Sheet Number / Numéro de la feuille	C

Linear dimensions in millimeters Dimensions linéaires en millimètres

Consultant's Name / Nom de l'expert-conseil Engineer's Stamp /
Sceau de l'ingénieur

Client / client

PARKS CANADA AGENCY
WESTERN REGION

Project Title / Titre du projet

WORKHORSE BARN
HERITAGE RECORD
UPDATE 2011

Bar U Ranch N.H.S

Drawing Title / Titre du dessin

PHOTO KEY PLANS

Drawn by/Dessiné par Surveyed by/Arpenté par Date
ANITA SEWALL PAT MCFADDEN DECEMBER 2011

Designed by/Concept par Reviewed by/Revisé par Scale/Echelle
1:50

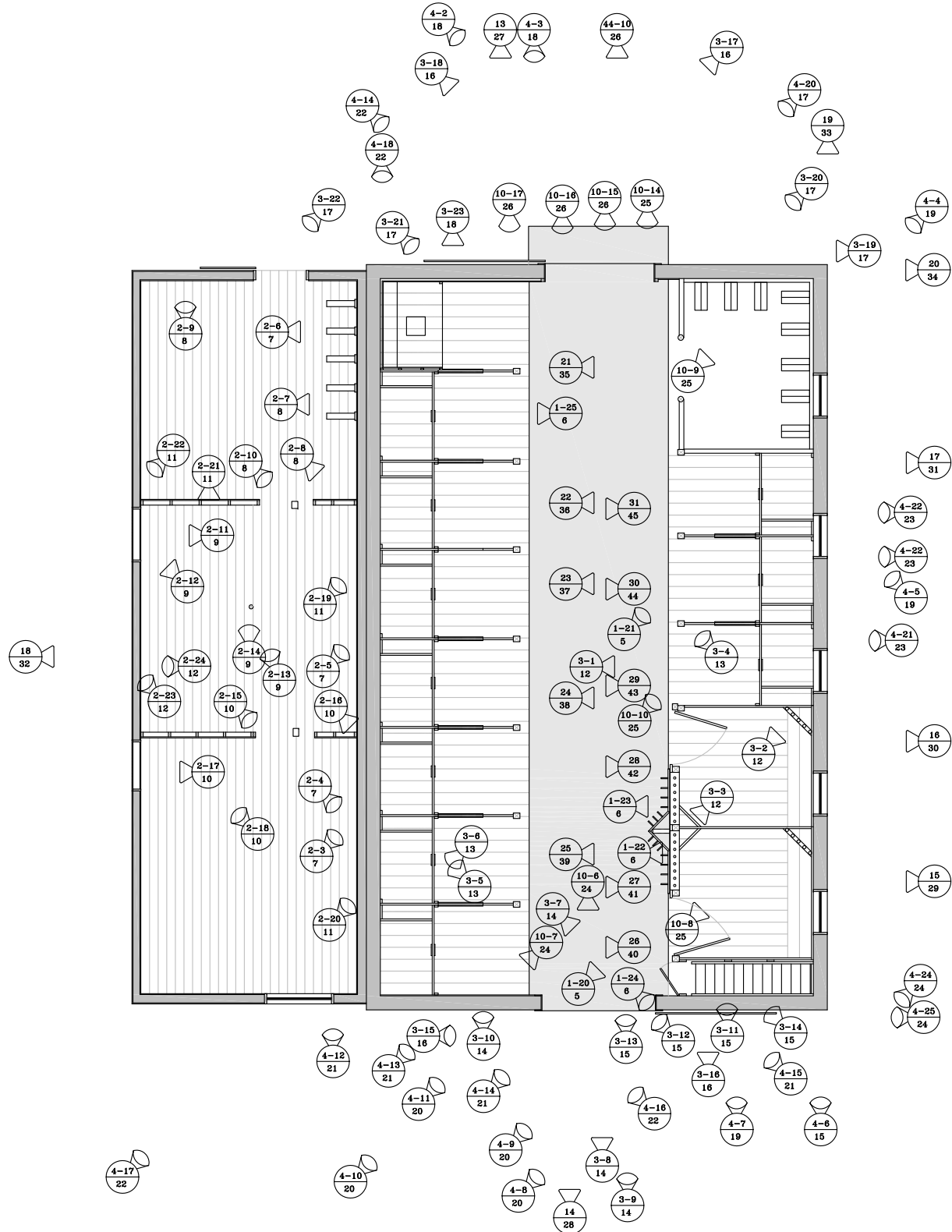
Client Acceptance/Acceptation du client Approved by/Approuvé par

Park Responsible Officer/Agent Responsable Date A & E Services/Genie et Architecture Date

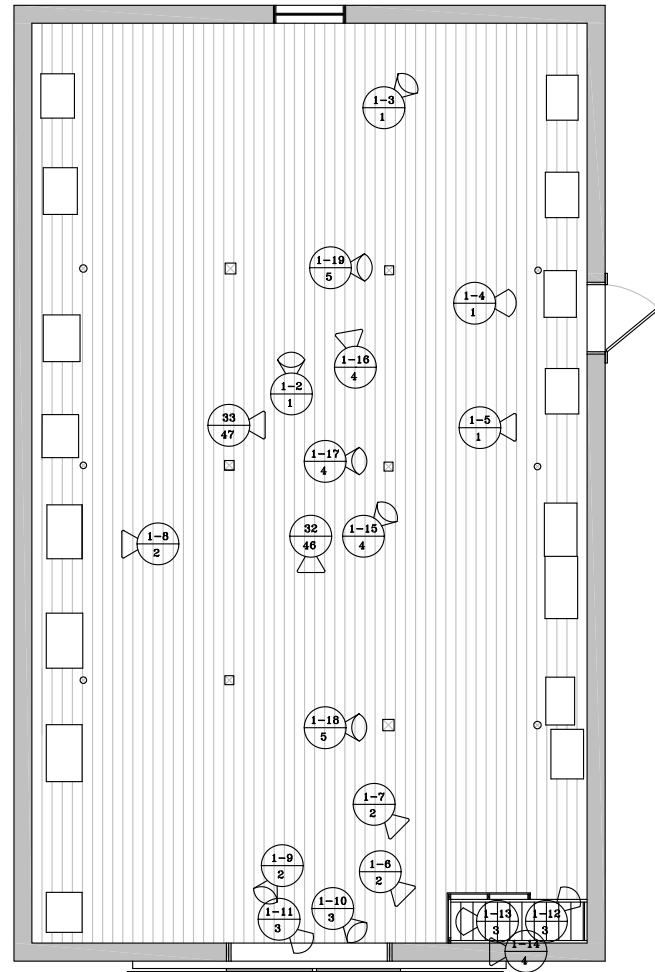
Project No./N° du projet Asset No./N° du bien Sheet No./de
la feuille
R.041811.024 14

Reference No./N° de référence du dessin
R.041811.024

14 of 14



25 MAIN FLOOR PHOTO KEY PLAN
1:4 SCALE 1:50



26 SECOND FLOOR PHOTO KEY PLAN
1:4 SCALE 1:50