Public Works and Government Services Canada

Requisition No. EZ899-160310

MERX I.D. No. _____

SPECIFICATIONS
for
RADAR HILL VIEWPOINT SHELTER

Radar Hill, B.C.

Project No. R.073927.001 May 2015

APPROVED BY:

_____ 2015-05-14
Regional Manager of AES Date

_____ 20150505
Regional Construction Safety Coordinator Date

TENDER:

_____ 15/05/20
Project Manager Date

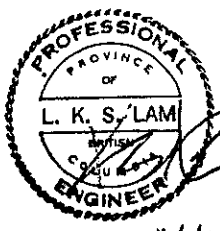
Real Property Services Branch, Professional and Technical Services, Pacific Region
#219- 800 Burrard Street, Vancouver, B.C. V6Z 2V8

APPENDIX

A R715-0205-01 Radar Hill Lookout Shelter Assessment_2015-02-27 (2)

LIST OF DRAWINGS
Bound Separately

S100 Title Sheet and Key Map
S101 General Notes
S102 Existing Photos
S201 Top South Platform Plans
S202 Middle North East Platform Plans
S203 Lower North West Platform Plans
S301 Shelter Sections & Details
S302 Sections & Details



MAY 11, 2015

1. Codes

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

2. Description of Work

.1 Work under this Contract is to take place at Radar Hill Viewpoint Sites at Park's Parks Canada's Pacific Rim Parks, Radar Hill, B.C. Access to the vicinity of the site is not restricted.

.2 Works to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:

.1 Remove and cart away existing wood deck, planter walls, Designated monument and miscellaneous blocks and stairs from top south, middle NE and lower NW platforms off site.

.2 Replace with new wood deck/ramp, seats, planter walls and install a new Viewpoint Shelter to Top S platform.

.3 Replace with new cedar stair complete with upper and lower concrete curb to middle NE platform on south side across walk path.

.4 Replace with new wood deck/ramps, seats, planter walls and new Monument to lower NW platform.

.5 All work shall be completed with temporary work and precautions to meet WCB requirements.

.3 "Green" requirements:

.1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.

.2 Use only materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.

.3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from site.

.4 Existing Landscape:

.1 The existing landscape is part of Viewpoint Sites. The Contractor and their sub trade personnel shall pay utmost attention to the preservation of all existing items on this site at all times during construction. Prior to the commencement of this project, the Contractor shall submit to the Departmental Representative a list of all proposed protection measures for his review. This list must identify procedures for the protection of adjacent existing materials and elements to prevent accidental damage to this national historic site for the duration of construction.

3. Contract Documents

.1 The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.

.2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

4. Division of Specifications

.1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.

.2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.

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

5. Time of Completion

.1 No work on site until Tuesday September 8, 2015 and complete the project by Twelve (12) weeks after September 8, 2015.

6. Hours of Work

.1 No limits on the hours of work by the Contractor on exterior work area but subject to municipal bylaws for noise control. The work hours shall be between 7:30am to 5:30pm with 5 days a week, Monday to Friday.

7. Work Schedule

.1 Carry on work as per indicated "PHASES" and as follows:

.1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:

.1 Submissions of shop drawings, product data, MSDS sheets and samples.

.2 Commencements and completion of work of each section of the specifications or trade for each phase as outlined with all exterior work schedule to be completed in first 60 days from commencement of the contract.

.3 Final completion date within the time period required by the Contract documents.

.2 Do not change approved Schedule - without notifying Departmental Representative.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to

8. Cost Breakdown

.1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail **(per each Upper, Middle and Lower Platform)** as directed by the Departmental Representative and aggregating Contract price. After approval by Department Representative, cost breakdown will be used as basis for progress payments.

9. Codes, Bylaws, Standards

.1 Perform work in accordance with the National Building Code of Canada (NBC) 2010, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.

.2 All applicable local bylaws, rules and regulations enforced at the location concerned shall be complied with.

.3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

.4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

10. Documents Required

.1 Maintain 1 copy each of the following at the job site:
.2 Contract drawings.
.3 Contract specifications.
.4 Addenda to Contract documents.
.5 Copy of approved work schedule.
.6 Reviewed/approved shop drawings.
.7 Change orders.
.8 Other modifications to Contract.
.9 Field test reports.
.10 Reviewed/approved samples.
.11 Manufacturers' installation and application instructions.
.12 One set of record drawings and specifications for "as-built" purposes.
.13 National Building Code of Canada 2010.
.14 Current construction standards of workmanship listed in technical Sections.

.15 Project Safety Plan.

11. Regulatory Requirements

.1 No permits required by regulatory municipal, provincial or federal authorities to complete the work.

.3 The work installed shall conform to the requirements of the Departmental Representatives.

12. Contractor's Use of Site

.1 Use of site:

.1 Contractor's site office & staff parking and storage Area shall be designated at indicated area on site plan.
.2 Exclusive and completeness for execution of work as defined within all repair as indicated on drawings.
.3 Assume the responsibilities of assigned premises for performance of this work.
.4 Be responsible for coordination of all work activities on site, including the work of other contractors.

.2 Perform all works in accordance with the Contract documents. Ensure work is carried out in accordance with indicated phasing.

.3 Do not unreasonably encumber site with material or equipment.

.4 Access and Egress of site:

.1 Design, construct and maintain temporary "access to" And "egress from" construction areas, with temporary fences and gates.
.2 Contractor vehicles at site is allowed only at designated area as directed by employee of Parks Canada. Refer to Parks Official for restricted access and loading requirement.

13. Examination

.1 Examine site and be familiar and conversant with existing conditions likely to affect work.

.2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.

14. Existing Services and Work Restrictions

.1 Where work involves breaking into or connecting to existing watercourses, storm or sanitary sewers, or onto adjacent surrounding.

.2 Carry out work Monday to Friday 7:30 to 17:30 hours. for all exterior work. Contractor must obey regulations including safety and fire regulations.

.3 Comply with smoking restrictions

.1 Smoking is allowed only in area 6 metres away from the vicinity of site.

.4 Execute work with least possible interference and provide temporary means of maintaining security and safety.

.5 Contractor to provide sanitary facilities and keep clean for use by their personnel or use public washroom in the vicinity of the site.

15. Cutting and Patching

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove items so shown or specified.

.3 Do not cut, bore, or sleeve load-bearing members unless noted

otherwise.

.4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

.5 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval and match existing material, color, finish and texture.

.7 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light.

16. Setting Out of Work

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.2 Provide devices needed to lay out and construct work.

.3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

17. Acceptance of Substrates

.1 Each trade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

18. Quality of Work

.1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.

.2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada 2010 and Construction Standards.

.3 In cases of dispute, decisions as to standard or quality of

work rest solely with the Departmental Representative, whose decision is final.

.4 Remedial Work:

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

.2 Perform remedial work required to repair or replace part or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

19. Works Coordination

.1 Coordinate works of sub-trades:

.1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.

.2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.

.1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.

.2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.

.3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.

.4 Publish minutes of each meeting.

.5 Submit copies of coordination drawings and meeting minutes to Departmental Representative for information purposes.

.3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.

.4 Work cooperation:

.1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.

.2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

.3 Ensure disputes between subcontractors are resolved.

.5 Departmental Representatives is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.

.6 Maintain efficient and continuous supervision.

20. Approval of Shop Drawings, Product Data and Samples

.1 Shop drawings are to be prepared by Contractor, subcontractor, supplier or distributor. Drawings shall illustrate the appropriate portion of the work, showing fabrication, layout, setting or erection details as specified in appropriate sections.

.2 Product data: certain specification sections specify that manufacturers' standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop

drawings, provided that the product concerned is clearly identified. Submit in sets, not as individual submissions.

.3 Samples:

(1) Submit samples in sizes and quantities specified.

.4 Submission requirements:

(1) Schedule submissions at least 10 days before the date the reviewed submissions will be needed.

(2) Submit the number of copies of shop drawings and/or product data which Contractor requires for distribution plus copies which will be retained by the Departmental Representative.

(3) Accompany submissions with transmittal letter in duplicate; Submit either 4 diazo copies or 1 reproducible transparency as directed by the Departmental Representative.

.5 Co-ordination of submissions:

(1) Review shop drawings, product data and samples prior to submission.

(2) Co-ordinate with field construction criteria.

(3) Verify catalogue numbers and similar data.

(4) Co-ordinate each submittal with the Contract documents and the requirements of the work of all trades.

(5) The Contractor's responsibility for errors and omissions in submittals is not relieved by the Departmental Representative's review of submittals.

(6) The Contractor's responsibility for deviations in submittals from the requirements of the Contract documents is not relieved by the Departmental Representative's review of submittals unless the

Departmental Representative gives written acceptance of specified deviations.

.6 Notify Departmental Representatives in writing, at time of submission, of deviations in submittals from the requirements of the Contract documents.

.7 After Departmental Representative's review, distribute copies

.8 Allow sufficient time (2 weeks) for each of the following:
- .1 Review of product data.
- .2 Approval of shop drawings.
- .3 Review of re-submission.

.9 The review of shop drawings by Public Works and Government Services Canada is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and Contract documents. Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.

21. Relics and Antiquities

.1 Relics and antiquities and items of historical or scientific interest shall remain property of Department. Protect such articles and request directives from Departmental Representative.

.2 Give immediate notice to Departmental Representative if evidence of archeological finds are encountered during excavation/construction, and await Departmental

Representative's written instructions before proceeding with work in this area.

23. Project Meetings

.1 Departmental Representatives will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

24. Testing and Inspections

.1 Particular requirements for inspection and testing to be carried out by testing service or laboratory approved by the Departmental Representative are specified under various sections.

.2 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for the following:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Provide testing with certificates upon Departmental Representative's request:.
  - .1 Mill tests and certificates of compliance.

.3 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.

.4 Contractor shall furnish labor and facilities to:

- .1 Notify Departmental Representative in advance of planned testing.

.5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.6 Pay costs for uncovering and making good work that is

covered before required inspection or testing is completed and approved by Departmental Representative.

.7 The Departmental Representative may require, and pay for, additional inspection and testing services not included in Paragraph 24.1.

.8 Provide Departmental Representative with 2 copies of testing laboratory reports as soon as they are available.

.9 Ensure that work to be inspected is complete at the time of inspection and in accordance with the contract documents. Additional inspections required due to the incomplete work or poorly executed work, as judged by the departmental representative, as well as additional design or remedial work caused by deviations from these drawings, may be charged to the contractor.

.10 A minimum 96 hours notice shall be given to the departmental representative by the contractor for any inspection to be carried out.

25. As-Built Documents

.1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.

.2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.

26. Delivery, 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 cementitius products clear of earth or wood decks, and away from planter 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 increment weather.

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

.7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.8 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use similar material to match original.

27. Cleaning

.1 Daily conduct cleaning and disposal operations.

Comply with local ordinances and anti-pollution laws.

.2 Ensure clean up of the work areas each day after completion of work.

.3 On completion of the work, remove all temporary buildings and offices, site sign, all debris, rubbish, etc., clean-up site and leave same neat and tidy to the satisfactory of the Departmental Representative.

.4 In preparation for interim and final inspections:

.1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.

.2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all sight-exposed

finished surfaces.

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

.6 Refer to Health and Safety Requirements (01 35 33) for more requirements.

28. Work Barriers including Dust Control

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

.2 Provide barrier around existing landscape designated to remain. Protect from damage by equipment and construction procedures.

29. Environmental Protection

.1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.

.2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers. Construction methods shall be employed to ensure no fuels, oils, wood preservatives or other contaminants enter the site subsoil and/or surrounding terrain. As general Mitigation Measures for this project, it must be enforced and closely supervised and monitored as follows:

.1 All contractors and work crews must be briefed upon the importance of adhering to prescribed best practices or mitigation measures. Project meeting prior to commencement of the work shall indicate the above requirements have been fully explained to the contractor and staff.

.2 A copy of the mitigation measures shall be posted in a conspicuous location on site or readily accessible for reference.

.3 Conduct work in a manner clearly separates visitors from the active construction area on site to minimize potential accidents for public safety.

.4 Contractor and sub trade staffs must be retained in spill response and reporting procedures including containment methods. In the event of a spill contact the Provincial Emergency Program at 1-800-663-3456.

.5 The contractor is to have personnel on site that are trained and ready to us the spill containment kits. Ensure proper disposal procedures in accordance with all applicable territorial regulations. Fires and burning of rubbish on site not permitted

.6 The Contractor must have all spill containment kits ready for immediate deployment, containing sufficient quantities of absorbent materials on site in close proximity to working machinery and equipments such as fuel portable generator, air compressors, hoist and tools.

.7 The Contractor must Stage to stockpile material on designated area such as roadway, previously disturbed area or site with high resiliency.

.8 Ensure all equipment used on site is clean And free from Contaminants.

.3 Do not use site area for borrow material.

.4 Do not dump excavated fill, waste material or debris in the vicinity of site.

.5 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

30. Materials Disposal

.1 All material designated to be removed will become the property of the Contractor and will be disposed of in an environmentally acceptable manner so that they neither become a menace to forest and natural habitat nor a nuisance to the public on adjacent or any other property.

.2 Unless otherwise specified, all existing material to be replaced or renewed will be disposed of in accordance with .1 above.

.3 Do not bury rubbish or waste material or dispose of waste, volatile materials, mineral spirit, oil, paint thinner into waterways, storm or sanitary sewers.

.4 For dispose of wastes and diversion of waste respectively of Waste Management and Disposal (01 74 19).

31. Additional Drawings

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

.2 Upon request, Departmental Representative may furnish up to a maximum of 10 sets of Contract documents for use by the Contractor at no additional cost. Should more than 10 sets of documents be required the Departmental Representative will provide them at additional cost.

32. Signage Requirement

.1 Install Signage supplied by Parks Canada and install on site at location as directed by Parks Canada Employee. Allow cost of transport for pickup and delivery onsite and installation. Remove and disposal of signage from site after project completion.

33. Measurement for Payment

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

34. Familiarization with Site

.1 Before submitting tender, visit site - as indicated in tender documents and become familiar with all conditions likely to affect the cost of the work with special attention to existing condition of the platforms to be replaced including anchorage difficulties of supports on rock at middle NE platform on south side across walk path during duration of construction for safety precaution.

35. Submission of Tender

.1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and inspected the site, and is fully conversant with all conditions. Prospective Bidders shall also include a Preliminary construction schedule to clearly indicate their proposed schedule of construction falls within the time frame be completed in 90 days from commencement of the contract.

END OF SECTION

1. References

.1 Government of Canada.
- .1 Canada Labour Code - Part II
- .2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC):
- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 Canadian Standards Association (CSA) as amended:
- .1 CSA Z797-2009 Code of Practice for Access Scaffold For Construction Purposes.
- .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
- .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.

.4 Fire Protection Engineering Services, HRSDC:
- .1 FCC No. 301, Standard for Construction Operations.
- .2 FCC No. 302, Standard for Welding and Cutting.
- .3 HRSDE website: http://www.hrdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/index.shtml

.5 American National Standards Institute (ANSI):
- .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.6 Province of British Columbia::
- .1 Workers Compensation Act Part 3-Occupational Health and Safety.
- .2 Occupational Health and Safety Regulation
- .3 WorkSafeBC publication "*Safe Handling of Asbestos, A Manual of Standard Practices*".

.7 Yukon Territory
- .1 Occupational Health and Safety Act, R.S.Y.

2. Related Sections

.1 Refer to the following current NMS sections as required:

.1	General Instructions:	Section 011155
.2	Concrete Forming & Accessories	Section 031000
.3	Concrete Reinforcing	Section 032000
.4	Cast-in-place Concrete	Section 033000

.5	Metal Fabrications	Section 055000
.6	Rough Carpentry	Section 061011
.7	Heavy Timber Construction	Section 061300

3. Workers' Compensation Board Coverage

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

4. Compliance with Regulations

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

5. Submittals

.1 Submit to Departmental Representative submittals listed for review.

.2 Work effected by submittal shall not proceed until review is complete.

.3 Submit the following:

- .1 Health and Safety Plan.
- .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
- .3 Copies of incident and accident reports.
- .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .5 Emergency Procedures.

.4 The Departmental Representative will review the Contractor's

site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

.6 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:

.1 Be construed to imply approval by the Departmental Representative.

.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.

.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

6. Responsibility

.1 Assume responsibility as the Prime Contractor for work under this contract.

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

7. Health and Safety Coordinator

.1 The Health and Safety Coordinator must:

.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

.3 Be on site during execution of work.

8. General Conditions

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure site at night time as deemed necessary to protect site against entry.

9. Project/Site Conditions

.1 Work at site will involve contact with:

.1 Installation of new material to replace existing elements.

.2 This is a semi-isolated and national historic location.

.3 This is a known wildlife coastal location.

.4 Steep and uneven terrain of soft mud under pier will be encountered.

10. Regulatory Requirements

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

11. Work Permits

.1 No permits are required related to this project.

12. Filing of Notice

.1 The Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

13. Health and Safety Plan

.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety/organization chart for project.

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work.

.4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

13. Health and Safety Plan (continued)

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

14. Emergency Procedures

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:

- .1 Designated personnel from own company.
- .2 Regulatory agencies applicable to work and as per legislated regulations.
- .3 Local emergency resources.
- .4 Site Departmental Representative.

.2 Include the following provisions in the emergency procedures:

- .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
- .2 Evacuate all workers safely.
- .3 Check and confirm the safe evacuation of all workers.
- .4 Notify the fire department or other emergency responders.
- .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
- .6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

- .1 Work at high angles.
- .2 Work in confined spaces or where there is a risk of entrapment.
- .3 Workplaces where there are persons who require physical

assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

15. Hazardous Products

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the products intended for use. Submit applicable MSDS and WHMIS documents as per clause 26 and 27 in Section 011155.

.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.

16. Electrical Safety Requirements

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

17. Electrical Lockout

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare

and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

18. Overloading

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

19. Falsework

.1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003) Falsework for Construction purposes.

20. Scaffolding

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 Code of Practice for Access Scaffold and B.C. Occupational Health and Safety Regulations.

21. Confined Spaces

.1 Carry out work in confined spaces in compliance with Occupational Health and Safety Regulations, Part 9 in B.C.

22. Powder-Actuated Devices

.1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

23. Fire Safety and Hot Work

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks

24. Fire Safety Requirements

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

25. Fire Protection System

.1 Fire protection systems shall be available at the cost of contractor onsite.

26. Unforeseen Hazards

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

27. Posted Documents

.1 Post legible versions of the following documents on site:

- .1 Health and Safety Plan.
- .2 Sequence of work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plans or site plans.
- .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable. The General Contractor to include the name of the "qualified coordinator responsible for the coordination of health and safety activities" in accordance with Section 118 of the Workers' Compensation Act.

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

28. Meetings

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

29. Correction of Non-Compliance

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

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

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

END OF SECTION

.1 Waste Management Goals

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's Waste Management Plan and Goals.

.2 PWGSC's Waste Management Goal 75 percent of total Project Waste to be diverted from landfill sites. Provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.

.3 Accomplish maximum control of solid construction waste.

.4 Preserve environment and prevent pollution and environment damage.

.2 Related Sections

.1 Section 03 10 00 -Concrete Forming and Accessories

.2 Section 03 20 00 -Concrete Reinforcing

.3 Section 03 30 00 -Cast-in-place Concrete

.4 Section 05 50 00 -Metal Fabrications

.5 Section 06 10 11 -Rough Carpentry

.3 References

.1 LEED Canadian Green Building Council (CGBC), Green Building Rating System, For New Construction and Major Renovations LEED Canada-NC, Version 1.0 - December 2004.

.4 Definitions

.1 Class III: non-hazardous waste - construction renovation and demolition waste.

.2 Cost/Revenue Analysis Work Plan (CRAW): based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.

.3 Demolition Waste Audit (DWA): relates to actual waste generated from project.

.4 Inert Fill: inert waste - exclusively asphalt and concrete.

.5 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.8 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.

.9 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.

.10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.11 Separate Condition: refers to waste sorted into individual types.

.12 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.

.13 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

.14 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.15 Waste Reduction Work Plan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. Refer to Schedule B. WRW is based on information acquired from WA (Schedule A).

.5 Documents

.1 Maintain at job site, one copy of following documents:
- .1 Waste Audit.
- .2 Waste Reduction Work Plan.
- .3 Material Source Separation Plan.
- .4 Schedules A, B, C, D completed for project.

.6 SUBMITTALS

.1 Submittals in accordance with Section 01 11 55 – General Instructions.

.2 Prepare and submit following prior to project start-up:
- .1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
- .2 Submit 2 copies of completed Waste Reduction Work Plan (WRW): Schedule B.
- .3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
- .4 Submit 2 copies of Cost/Revenue Analysis Work Plan (CRAW): Schedule D.
- .5 Submit 2 copies of Materials Source Separation Program (MSSP) description.

.3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
- .1 Failure to submit could result in hold back of final payment.
- .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled or disposed of.
- .3 For each material reused, sold or recycled from project, include amount quantities by number, type and size of items and the destination.
- .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

.7 Waste Audit (WA)

.1 Conduct WA prior to project start-up.

.2 Prepare WA: Schedule A.

.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

.8 Waste Reduction Workplan (WRW)

.1 Prepare WRW prior to project start-up.

.2 WRW should include but not limited to:

- .1 Destination of materials listed.
- .2 Deconstruction/disassembly techniques and sequencing.
- .3 Schedule for deconstruction/disassembly.
- .4 Location.
- .5 Security.
- .6 Protection.
- .7 Clear labelling of storage areas.
- .8 Details on materials handling and removal procedures.
- .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.

.3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.4 Describe management of waste.

.5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.

.6 Post WRW or summary where workers at site are able to review content.

.7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.

.8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.

.9 Demolition Waste Audit (DWA)

.1 Prepare DWA prior to project start-up.

.2 Complete DWA: Schedule C.

.3 Provide inventory of quantities of materials to be salvaged for reuse, recycling, or disposal.

.10 Cost/Revenue Analysis Workplan (CRAW)

.1 CRAW: Schedule D.

.11 Materials Source Separation Program (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.

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

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

.1 Transport to approved and authorized recycling facility.

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.

.1 Ship materials to site operating under Certificate of Approval.

.2 Materials must be immediately separated into required categories for reuse or recycling.

.12 Waste Processing Sites

.1 Contact Departmental Representative for Waste Processing Sites in B.C..

.13 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 for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas. Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

- .1 On-site source separation is recommended.
- .2 Remove co-mingled materials to off-site processing facility for separation.
- .3 Provide waybills for separated materials.

.14 Disposal of Wastes

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials 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.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

.15 Use of Site and Facilities

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Provide temporary security measures approved by Departmental Representative.

.16 Scheduling

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

.17 Products

.1 **NOT USED**
.1 Not Used.

.18 Application

.1 Do Work in compliance with WRW.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

.19 Cleaning

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

.20 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, reusable, recyclable materials is not permitted.

.3 Construction Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Steel	100	
Wood (uncontaminated)	100	
Other	100	

.21 Waste Audit (WA)

.1 Schedule A – Waste Audit (WA):

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood						
Metal						
Other						

.22 Waste Reduction Workplan (WRW)

.1 Schedule B:

(1) Material Category	(2) Person(s) Respon-sible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected	Actual	(5) Recycled Amount (unit) Projected	Actual	(6) Material(s) Destina-tion
Wood							
Metal							
Other							

.23 Demolition Waste Audit (DWA)

.1 Schedule C - Demolition Waste Audit (DWA):

(1) Material Description	(2) Quantity	(3) Unit	(4) Total	(5) Volume (cum)	(6) Weight (cum)	(7) Remarks and Assumption s
Wood						
Metal						
Other						

.24 Cost/Revenue Analysis Workplan (CRAW)

.1 Schedule D - Cost/Revenue Analysis Work Plan (CRAW):

(1) Material description	(2) Total Quantity (unit)	(3) Volume (cum)	(4) Weight (cum)	(5) Disposal Cost/Credit $(+/-)	(6) Category Sub-Total $(+/-)
Wood					
Metal					
Other					$
		(7) Cost (-) / Revenue (+)			$

.25 Canadian Government Departments Chief Responsibility for the Environment

.1 Schedule E - Government Chief Responsibility for the Environment:

Province	Address	General Inquires	Fax
British Columbia	Ministry of Environment Lands and Parks 810 Blanshard Street, 4th Floor Victoria BC V8V 1X4	604-387-1161	604-356-6464
	Waste Reduction Commission Soils and Hazardous Waste 770 South Pacific Blvd, Suite 303 Vancouver BC V6B 5E7	604-660-9550	604-660-9596

END OF SECTION

PART 1 GENERAL

1.1 Related Work

.1	Section 31 23 10	Excavating, Trenching and Backfilling
.2	Section 03 20 00	Concrete Reinforcing
.3	Section 03 30 05	Cast-In-Place Concrete Short Form

1.2 References

.1 Canadian Standards Association (CSA International)

- .1 CSA-A23.1-09/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-14, Engineering Design in Wood.
- .3 CSA O121-M2008 (R2013), Douglas Fir Plywood.
- .4 CSA O151-09 (R2014), Canadian Softwood Plywood.
- .5 CSA O153-13, Poplar Plywood.
- .6 CAN/CSA-O325-07 (R2012), Construction Sheathing.
- .7 CSA O437 Series-93 (R2011), Standards for OSB and Waferboard.
- .8 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
- .9 CAN/CSA-S269.3-M92 (R2013), Concrete Formwork, National Standard of Canada

1.3 Submittals

.1 Submittals in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Submit shop drawings for formwork and falsework.

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 33 – Health and Safety Requirements.

.4 Co-ordinate submittal requirements and provide submittals required by Section 01 33 00.

.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. Comply with CSA S269.1, for falsework drawings and Comply with CAN/CSA-S269.3 for formwork drawings.

.6 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.7 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.4 Delivery, Storage and Handling

.1 Store and manage hazardous materials in accordance with Section 01 51 00 – Temporary Facilities.

.2 Waste Management and Disposal:

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

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Divert wood materials from landfill to a recycling, reuse, composting facility as approved by Departmental Representative.

.4 Divert plastic materials from landfill to a recycling, reuse, composting facility as approved by Departmental Representative.

.5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

PART 2 PRODUCTS

2.1 Materials

.1 Materials and resources in accordance with Section 01 61 00 – Requirements.

.2 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series, CSA-O153.

.2 Rigid insulation board: to CAN/ULC-S701.SPEC NOTE: Drawings should designate areas requiring special architectural concrete features.

.3 Form ties:

.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.4 Form liners:

.1 Plywood: high density overlay, medium density overlay, Douglas Fir to CSA O121, Canadian Softwood Plywood to CSA O151 or Poplar to CSA O153 grade, square edge, 20 mm thick.

.5 Form release agent: non-toxic, biodegradable, low VOC.

.6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.7 Falsework materials: to CSA-S269.1.

PART 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 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.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 Do not place shores and mud sills on frozen ground.

.6 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.7 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.

.8 Align form joints and make watertight.

.1 Keep form joints to minimum.

.9 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.11 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.

.12 Line forms for following surfaces:

.1 Outer face of outside girders beams and vertical edge of sidewalk slab.

.2 Soffit of girders and underside of bridge decks if exposed.

.3 Exposed faces of abutments, wingwalls, piers and pylons: do not stagger joints of form lining material and align joints to obtain uniform pattern. Secure lining taut to formwork to prevent folds.

.4 Pull down lining over edges of formwork panels.

.5 Ensure lining is new and not reused material.

.6 Ensure lining is dry and free of oil when concrete is poured.

.7 Application of form release agents on formwork surface is prohibited where drainage lining is used.

.8 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.

.9 Cost of textile lining is included in price of concrete for corresponding portion of Work.

.13 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 Removal and Shoring

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 Three days for pilasters.

.2 Three days for other structural members, or one days when replaced immediately with adequate shoring to standard specified for falsework.

.3 One days for footings and abutments.

.2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

PART 1 GENERAL

1.1 Related Work

.1 Section 03 10 00 — Concrete Forming and Accessories

.2 Section 03 30 00 — Cast-In-Place Concrete Short Form

1.2 Measurement Procedures

.1 Measure reinforcing steel in kilograms tonnes of steel incorporated into Work, computed from theoretical unit mass specified in CAN/CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Departmental Representative.

.2 No measurement will be made under this Section.

.1 Include reinforcement costs in items of concrete work in Section 03 30 05 - Cast-In-Place Concrete.

1.3 References

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.1 ACI 315-99, Details and Detailing of Concrete Reinforcement.

.2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A143/A143M-07 (R2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1-04/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-A23.3-04 (R2010), Design of Concrete Structures.

.3 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.

.4 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-M92 (R2013), Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.

.6 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2011, Reinforcing Steel Manual of Standard Practice.

1.4 Submittals

.1 Submittals in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.

.3 Upon request, Submit shop drawings including placing of reinforcement and indicate:

.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.

.4 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated.

.1 Provide type A tension lap splices where indicated unless otherwise indicated.

When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

.5 Quality Assurance: Provide the following to the Departmental Representative.

.1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.5 Delivery, Storage and Handling

.1 Store and manage hazardous materials in accordance with Section 01 51 00 – Temporary Facilities.

.2 Waste Management and Disposal:

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

.2 Place materials defined as hazardous or toxic in designated containers.

PART 2 PRODUCTS

2.1 Materials

.1 Materials and resources in accordance with Section 01 61 10- Product Requirements.

.2 Substitute different size bars only if permitted in writing by Departmental Representative.

.3 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.4 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.

.5 Cold-drawn annealed steel wire ties: to ASTM A497/A497M.

.6 Deformed steel wire for concrete reinforcement: to ASTM A497/A497M.

.7 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.8 Mechanical splices: subject to approval of Departmental Representative.

.9 Plain round bars: to CSA-G40.20/G40.21.

2.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.1 ACI 315R unless indicated otherwise.

.3 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.4 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.5 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, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 EXECUTION

3.1 Preparation

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

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 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

3.4 Field Touch-Up

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

PART 1 GENERAL

1.1 Related Work

.1	Section 03 10 00	Concrete Forming and Accessories
.2	Section 03 20 00	Concrete Reinforcing

1.2 References

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM A1064/A1064M-09, Standard Specification for Carbon-Steel wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .2 ASTM D1751-04 (R2013), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).

.2 Canadian Standards Association (CSA International)

- .1 CSA-A23.1/A23.2-2004 (R2014), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014) & Update No. 2 (2014).
  - .1 CSA-A3001-13, Cementitious Materials for Use in Concrete.
- .2 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.

1.3 Design Requirements

Alternative 2 - Prescription: in accordance with CSA-A23.1/A23.2, and as described in Mixes of PART 2 - PRODUCTS.

1.4 Submittals

.1 Submittals in accordance with Section 01 33 00 – Shop Drawings, Product Data and Samples.

.2 Shop Drawings:

- .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and all necessary details of reinforcing.
- .2 Submit drawings showing formwork and falsework design to: CSA-A23.1/A23.2.
- .3 Drawings to bear stamp and signature of qualified professional engineer registered or licensed in British Columbia.

.3 At least 4 weeks prior to beginning Work, inform Departmental Representative source of fly ash and submit samples to Departmental Representative.

- .1 Do not change source of Fly Ash without written approval of Departmental Representative.

.4 At least 4 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound.

.5 Submit samples of materials to be used in concrete mix for testing:

.1 Supplementary cementing materials.

.2 Blended hydraulic cement.

.3 Admixture.

.6 Submit testing inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.7 Concrete hauling time: submit for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

1.5 Quality Assurance

.1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 Delivery, Storage and Handling

.1 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to by the Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by the Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.7 Waste Management and Disposal

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

.2 Ensure emptied containers are sealed and stored safely.

.3 Use excess concrete for footing bottom.

.4 Divert unused concrete materials from landfill to local facility as reviewed by Departmental Representative.

.5 Provide appropriate area on job site where concrete trucks and be safely washed.

.6 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Departmental Representative.

.7 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard

PART 2 PRODUCTS

2.1 Materials

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Blended hydraulic cement: Type GUb to CAN/CSA-A3001.

.3 Supplementary cementing materials: with minimum 10% Type F fly ash replacement, by mass of total cementitious materials to CAN/CSA A3001.Water: to CSA-A23.1/A23.2.

.4 Air entraining admixture: to CAN/CSA-23.1

.5 Chemical admixtures: to CAN/CSA-A23.1 as approved by Departmental Representative.

.6 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.

.7 Welded steel wire fabric: to ASTM A1064/A1064M

.8 Premoulded joint filler:

.1 Bituminous impregnated fibreboard: to ASTM D1751.

.8 Joint sealer/filler: grey to CAN/CGSB-19.24, Type 1, Class B.

.9 Sealer: boiled linseed oil to ASTM D260, mixed with mineral spirits 1:1 proprietary poly-siloxane resin blend. Exterior pavement areas : to ASTM C309 Liquid Membrane-Forming compound for Curing Concrete, Type 1.

.10 Other concrete materials: to CSA-A23.1/A23.2.

2.2 Mixes

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give the following properties:

.1 Cement: Type GU Portland cement

.2 Minimum compressive strength at 28 days, class of exposure and nominal size of coarse aggregate:

Member	minimum 28-days strength (MPa)	maximum aggregate size (mm)	exposure class Category	air content
Exterior footings & Pilasters	32	20	C-2	2

.3 Slump at time and point of discharge: To CSA-A23.1 Clause 4.3.2.3. When super plasticizers are used, the slump may be increased by shall kept below the point where segregation will occur. The cost of super plasticizers shall be included in the cost of the concrete. Smaller aggregate size may be used where necessary to increase slump.

.4 Air content: To CSA-A23.1 Table 2 & 4 to suit appropriate exposure class.

.5 Chemical admixtures: following admixtures in accordance with to ASTM C494M. Admixtures shall contain no salts or acids.

.6 Concrete mix designs shall be submitted to a material consultant for approval and to Departmental representative for review prior to any concrete work.

PART 3 EXECUTION

3.1 Preparation

.1 Provide Departmental Representative 72 hours notice before each concrete pour.

.2 Place concrete to CAN/CSA A23.1, Clause 19; Adhere strictly to CSA A23.1 for proper preparation of Cold Weather Concrete.

.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 rehandling, and without damage to existing structure or Work.

.5 Protect previous Work from staining.

.6 Clean and remove stains prior to application of concrete finishes.

3.2 Construction

.1 Perform cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

3.3 Inserts

.1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.

Sleeves and openings greater than 100 mm x 100 mm not indicated must be reviewed by Departmental Representative.

3.4 Finishes

.1 Formed surfaces exposed to view: sack rubbed finish in accordance with CSA-A23.1/A23.2.

.2 Pavements, walks, curbs and exposed site concrete:

.1 Screed to plane surfaces and use [aluminum] [magnesium] [wood] floats.

.2 Provide round edges and joint spacings using standard tools.

.3 Trowel smooth to provide lightly brushed non-slip finish.

3.5 Control Joints

.1 Cut and form control joints in slabs on grade at locations indicated, in accordance with CSA-A23.1/A23.2 and install specified joint sealer/filler.

3.6 Expansion and Isolation Joints

.1 Install premoulded joint filler in expansion and isolation joints full depth of slab flush with finished surface to CSA-A23.1/A23.2.

3.7 Curing

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and in accordance with CSA-A23.1/A23.2.

3.8 Site Tolerances

.1 Concrete floor slab finishing tolerance in accordance with CSA-A23.1/A23.2.

3.9 Field Quality Control

.1 Concrete testing: to CSA-A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative. Accelerated test methods will apply.

3.10 Verification

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - PRODUCTS, by Departmental Representative and provide verification of compliance.

3.11 Cleaning

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Cleaning of concrete equipment to be done in accordance with Section 01 35 43: Environmental Procedures.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.3 Section 03 30 00 - Cast-in-Place Concrete.

1.2 References

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A53/A53M-12, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269/A269M-14, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-M92 (R2013), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1-14, Limit States Design of Steel Structures.

.4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-13,Welded Steel Construction (Metal Arc Welding) (Imperial Version).

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:

.1 For finishes, coatings, primers and paints.

.2 Shop Drawings

.1 Submit 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.

1.4 Quality Assurance

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.1 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section.

1.5 Delivery, Storage, and Handling

.1 Packing, Shipping, Handling and Unloading:

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

.3 Storage and Protection:

.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated and cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 PRODUCTS

2.1 Materials

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W, 350W.

.2 Welding materials: to CSA W59.

.3 Welding electrodes: to CSA W48 Series.

.4 Bolts and anchor bolts: to ASTM A307; corrosion resistant types to ASTM A325M, Type 3. Provide all required anchoring devices including anchor clips, bar and strap anchors, expansion bolts and shields, and other devices designed to support and secure work.

.5 Grout: non-shrink, non-metallic, flowable, 15 MPa pull out strength 7.9 MPa at 24 hours.

.6 Security fasteners: screws and bolts with spanner type heads to prevent removal except with special tools; non-corrosive type.

2.2 Fabrication

.1 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Fabricate items from steel unless indicated otherwise; use galvanized steel for exterior items, unless indicated otherwise.

.3 Use self-tapping shake-proof countersunk flat headed screws on items requiring assembly by screws or as indicated. Use screws for exterior work. Use welded connections for exterior work, unless approved otherwise by Departmental Representative.

.4 Where possible, fit and shop assemble work, match mark, ready for erection.

.5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush with sharp edges and corners rounded to 3 mm radius. Where continuous welds may cause distortion of fabrication use stitch welds and plastic filler, grind and sand smooth.

.6 Seal exterior steel fabrications to provide corrosion protection in accordance with CAN/CSA-S16.1.

2.3 Finishes

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164.

PART 3 EXECUTION

3.1 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 such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 Miscellaneous Steel Brackets, Caps, Shoes, Beam Supports and Angles

.1 Supply for installation by respective trades. Drill for countersunk screws and anchor bolts.

3.3 Cleaning

.1 Perform cleaning after installation to remove construction and accumulate environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 01 50 – General Instructions

.2 Section 01 11 79 – Waste Management And Disposal.

.3 Section 05 50 00 – Metal Fabrications

.4 Structural Drawings S201 to S203 & S301 to S302 – Wood Products General Notes and Typical Details

1.2 Reference Standards

.1 Canadian Standards Association (CSA International)

- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA O121-08 (R2013), Douglas Fir Plywood.
- .4 CAN/CSA-O141-05 (R2014), Softwood Lumber.
- .5 CSA O151-09 (R2014), Canadian Softwood Plywood.
- .6 CAN/CSA-O325-07 (R2012), Construction Sheathing.
- .7 Comply with AWPA.M4 and revisions specified in CAN/CSA-080 Series, Supplementary Requirements to AWPA Standard M2.

.2 National Lumber Grades Authority (NLGA)

- .1 Standard Grading Rules for Canadian Lumber 2014.

1.3 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, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

1.4 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions for Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wood materials from construction site to recycling, reuse and composting facility approved by Departmental Representative.

.5 Do not dispose of preservative treated wood through incineration.

.6 Do not dispose of preservative treated wood with materials destined for recycling or reuse.

.7 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Departmental Representative.

.8 Dispose of unused wood preservative material at official hazardous material collections site approved by Departmental Representative.

.9 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other locations where they will pose health or environmental hazard.

PART 2 PRODUCTS

1.1 Lumber Material

.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.

.2 Blocking, nailing strips, curbs, fascia backing and sleepers:

- .1 Board sizes: "Cedar No. 2" or better grade.
- .2 Dimension sizes: "Cedar No. 2" light framing or better grade.
- .3 Post and timbers sizes: "Standard" or better grade species except as indicated.
- .4 Framing and board lumber: in accordance with NBCC 2010 Subsection 9.3.2, except as follows:
  - .1 Roof joists, studs, chords in built-up beams and deck plank: Cedar NLGA No.2 or better U.N.O.
  - .2 Log Post and Beams: Cedar species, NLGA No.1 grade.

2.2 Panel Materials

.1 Douglas fir plywood (DFP): to CSA O121, Exterior grade construction.

.2 Canadian softwood plywood (CSP): to CSA O151, Exterior grade construction.

.3 Plywood, OSB and wood based composite panels: t Exterior grade to CAN/CSA-O325.

2.3 Panel Materials End Uses

.1 Roof sheathing under roof waterproofing membrane: DFP Exterior sheathing grade T&G edge, 16 mm thick pressure preservative treated to para. 2.7.1.

.2 Miscellaneous plywood panels: DFP or CSP Exterior sheathing grade square edge, 19 mm thick, pressure preservative treated to para. 2.7.1 for wall backing, panel mounting boards and as indicated.

2.4 Damproof Membrane

.1 Wood plates in contact with concrete: use wood Cedar Grade No. 1 or better with compressible gasket filler of either 25 mm fibreglass insulation, closed cell polyethylene sponge 3 mm thick or roll roofing.

.1 Fibre glass insulation to: Section 07 21 30.
.2 Roll roofing: to CSA A123.2, Type S.
.3 Poly closed cell sponge gasket: as approved by Departmental Representative.

.2 Waterproofing membrane: Self-adhering or adhesive-applied SBS modified bituminous membrane minimum 1.5 mm thickness reinforced with material for application over primed substrate; of steel, galvanized steel, and plywood, conforming to the following:

.1 Tensile strength: 150 n/5 cm.
.2 Air permeance: less than 0.01 l/m sq. at 75 Pa pressure difference.
.3 Sheet membrane: conforming to CGSB 37-GP-56M-1980.
.4 Acceptable products:
  .1 Perm-a-Barrier System 4000, Grace Membrane Group
  .2 BlueSkin SA Air Barrier Membrane, Monsey-Bakor.
  .3 Sopraseal Stick 1100, Soprema.
  .4 QSC-705 Carlisle Coatings and Waterproofing.

2.5 Accessories

.1 Nails, spikes and staples: to CSA B111. All nailing shall be spiral nails or as indicated on drawings. If P-nails (Power driven nails) are intended as substitution, submit P-nails information for Departmental representative's review prior to use. Adjustment of nails spacing or requirements may be required.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and cut steel washers. All bolts and anchor bolts shall conform to ASTM A307. Bolt holes shall be 1 mm larger than the bolt diameter. Bolts in wood shall not be less than 7 diameter from the end and 4 diameters from the edge unless otherwise detailed.

.3 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.

.4 Steel plates: All steel plates used in connection details shall be grade 300W hot dipped galvanized.

.5 Lag screws: Lag screws shall be predrilled with a bit size of 65% of the shank diameter for the threaded portion. Lead holes shall be the same length as the unthreaded portion and the same diameter as the shank. Screw all lags into place. Cut washers shall be provided under heads which bear on wood.

.6 No checks or splits allowed at areas to be bolted or lagged.

.7 All bolts, steel plates/connections and nails for use with cedar wood to be hot dipped galvanized to ASTM A653 class G90 as produced by Simpson Strong Tie or approved equal by the Departmental representative.

.8 Galvanizing: to CSA G164 unless noted otherwise. Use galvanized fasteners for exterior work, interior highly humid areas.

.9 Joist/beam hangers, post bases: unless noted otherwise shall be hot dipped galvanized as per manufacture and approved by the Departmental representative.

2.6 Finishes

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for all exterior works, highly humid areas, pressure- preservative, and fire-retardant treated lumber.

.2 Stainless steel: use stainless steel or alloy for fastener for work mentioned in .1 above or alternative are acceptable and at contractors cost.

PART 3 EXECUTION

3.1 Installation

.1 Comply with requirement of NBCC 2010, Part 9 and General Notes on Structural Drawings. Where conflict exists, the more stringent requirements will apply.

.2 Install members true to line, levels and elevations.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Install lumber and panel materials so that grade-marks and other defacing marks are not visible or are removed by sanding at location (s) where exposed in final assembly.

.6 All built-up beams to be Cedar Grade No. 2 or better nailed through each lamination using 82 min. nails on a 150 mm grid.

.7 Install plywood roof sheathing with surface grain at right angles to roof framing. Provide solid blocking necessary to ensure maximum span on roof sheathing edge does not exceed 610 mm in either direction.

.8 Install sheathing over framing members as indicated using nails to NBCC part 9 requirements and in accordance with structural drawing.

.9 Apply waterproofing membrane over wood framing where wood framed wall is adjacent to backfill and concrete.

.10 Align and plumb faces of furring and blocking to tolerance of 1:600.

.12 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.13 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized, or steel fasteners.

.14 Install sleepers as indicated.

.15 Use of particle board is not permitted.

3.2 Erection

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

END OF SECTION

1.0 GENERAL

1.1 RELATED SECTIONS

.1 Submittal Procedures — Section 01 33 00

1.2 WORK INCLUDED

.1 Fabrication of timber platform consisting of log posts, beams, etc., and decking shall be as shown on drawings S201, S202, S203 & S301.

1.3 QUALITY ASSURANCE

.1 Grading:

.1 NBC Part 4 - Design, as applicable to Timber Construction

.2 Timber components and construction to CSA Standard O86.1 and according to N.L.G.A. Standard rules 2014 as applicable.

.3 Standards: CSA Standards S16.1 and O86.1 for Steel Connections.

1.4 REFERENCES:

.1 Canadian Standards Association (CSA International)

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
.2 CAN/CSA O86.1-01, Engineering Design in Wood.
.3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.

.2 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2014.

.3 American Society for Testing and Materials International, (ASTM)

.1 ASTM A 307-03, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile.
.2 A653/A653M-07, Standard Specification for Steel Sheet, Zinc-coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.3 ASTM D1413-07, Standard Test Method for Wood Preservatives by Laboratory Soil-block Cultures

1.5 SUBMITTALS

.1 Shop Drawings: submit drawings for all fabricated timber elements and connections of accordance with Section 01 33 00 – Submittal Procedures.

.2 Indicate grades of timber, shop applied finishes and prestaining requirements, shop and erection details including cuts, holes, fastenings and connection hardware.

.3 Review of shop drawings to be for size and arrangement of original and auxiliary members only. Such review will not relieve Contractor of responsibility for general and detail dimensions and fit or any errors or omissions.

.4 Drawings showing erection procedures and erection bracing to be prepared by fabricator. Erection procedures and details and size of temporary bracing is the responsibility of the Fabricator.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Storage of pre-fabricated components in Contractor's storage yard, piled off the ground and stacked to provide maximum air circulation and ventilation until required at Construction Site.

.2 Protect with tarps from water staining, soiling, dust and other construction activity until pick-up.

1.6 CONDITIONS

.1 Examine all conditions on which the successful work of this section depends.

.2 Refer to Drawings and Details for specific framing and connecting requirements.

2.0 PRODUCTS

2.1 MATERIALS

.1 General: all materials shall be new and of the quality and grade specified. No seconds, off grades or materials not meeting tolerance specifications will be accepted in the finished construction.

.2 All heavy timber elements shall be properly air dried to a maximum of 19% moisture content prior to installation.

.3 All round timber components shall be timber logs with sizes indicated on drawings.

.4 All sizes are rough.

.5 Connections:

.1 All bolts and pins shall conform to ASTM A307
.2 All bolts and nuts must be fitted with cut steel washers
.3 All steel plate used in connection details shall be grade 300W
.4 All nails and spikes shall conformed to CSA-B111
.5 Bolt holes shall be 1mm larger than the bolt diameter
.6 Bolts in wood shall not be less than 7 diameter from the end and 4 diameter from the edge unless otherwise detailed.
.7 No checks or splits allowed at areas to be bolted, pinned or lagged.

.6 Galvanizing: to ASTM A653/A653M Class G185 for all connection fasteners and related hardware.

3.0 EXECUTION

.1 Comply with the requirements of NBC 2010 Part 4 and CSA Standards O86.1.

.2 Install members true to line, levels and elevation, brace and anchor until permanently secured by structure.

.3 Install lumber materials so that grade marks or other defacing marks in exposed areas are not visible or are removed by sanding.

.4 Splice and joint only at locations indicated on reviewed shop drawings.

.5 Fit all members closely and accurately to all other members and other assembles.

.6 Maintain protection of all Heavy timber members until installation is complete.

.7 Install all metal fasteners in strict accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

1.1 REFERENCES

. 1 American Society for Testing and Materials International (ASTM)

.1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D698-12ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ;) (600 kN-m/m ;).

1.2 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
.1 Rock : solid material in excess of 0.75 m ; and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15m3 bucket. 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 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.
.3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
.5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
.6 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 toASTM D422 and ASTM C136 : Sieve sizes to CAN/CGSB-8.1 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.

1.3 EXISTING CONDITIONS

.1 Examine geotechnical report available from Departmental Representative. The contractor shall use the geotechnical report based on their sole interpretation of the report.

.2 Buried services:

- .1 Before commencing work verify 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 establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated on drawings.
- .8 Record location of maintained, re-routed and abandoned underground lines.
- .9 Confirm locations of recent excavations adjacent to area of excavation.

Part 2 Products

2.1 MATERIALS

.1 Type 1 and Type 2 fill:

- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.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 Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.3 Backfill material size gradations as specified in the geotechnical report are also acceptable.

.4 Use MMCD gradations for granular material for work occurring on 100 Mile House property.

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.

.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.

.2 Cut pavement neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

.1 Protect existing features in accordance with applicable local regulations.
.2 Keep excavations clean, free of standing water, and loose soil.
.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.
.5 Contractor to implement all recommendations outlined in the Geotechnical Site Assesment Report in regards to subgrade protection due to frost action and construction.

3.4 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as indicated as directed by Departmental Representative after area has been cleared of brush weeds and grasses and removed from site.
.2 Strip topsoil to depths as indicated as directed by Departmental Representative.
  .1 Do not mix topsoil with subsoil.
.3 Stockpile top soil to be incorporated into the works in locations as directed by Departmental Representative.
  .1 Stockpile height not to exceed 2 m and should be protected from erosion.
  .2 Dispose off site all excess topsoil material.

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 SHORING, AND BRACING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Worker's Compensation Board of British Columbia.
.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
.3 During backfill operation:
  .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
  .2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500mm above toe of sheeting.

.4 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.5 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site and restore watercourses as indicated and as directed by Departmental Representative.

3.7 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for the Departmental Representative review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.

.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions as directed by Departmental Representative.

.3 Excavation must not interfere with bearing capacity of adjacent foundations.

.4 Do not disturb soil within branch spread of trees or shrubs that are to remain.

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.5 All excavations are to adhere to WorkSafe BC requirements for excavations.

.6 Refer to geotechnical report following this section for recommendations with respect to safe excavations.

.7 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation. .8 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.9 Restrict vehicle operations directly adjacent to open trenches.

.10 Dispose of surplus and unsuitable excavated material in approved location.
.11 Do not obstruct flow of surface drainage or natural watercourses.
.12 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
.13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
.14 Correct unauthorized over-excavation as follows:
  .1 Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.
  .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.
.15 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.

3.9 ROCK REMOVAL

.1 Rock is to be removed by use of hydraulic breaker only. Under no circumstances shall shale, hardpan, frozen material, or soft or disintegrated rock material be classified as "rock" that can be removed by heavy excavating equipment having a minimum operating weight of 30 tonnes.

3.11 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:
  .1 Departmental Representative has inspected and approved installations.
  .2 Inspection, testing, approval, and recording location of underground utilities.
  .3 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 fro zen 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 Provide geotechnical testing for verification of compaction and backfill density in all trenches and submit test results to Departmental Representative.

3.12 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 as directed by Departmental Representative.
.3 Reinstate lawns to elevation which existed before excavation.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.5 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

R715-0205-01 Radar Hill

Lookout Shelter Assessment_2015-02-27 (2)

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February 27, 2015

Parks Canada
2040 A Pacific Rim Highway (P.O. Box 280)
Ucluelet, BC
V0R 3A0

Attention: Jackie Godfrey

Project: Radar Hill Shelter and Platform Replacement, Pacific Rim National Park, BC

Subject: Concrete and Geotechnical Assessment

INTRODUCTION

Levelton Consultants Ltd. (Levelton) is pleased to present this report for geotechnical and materials engineering services regarding the above captioned project. This scope of the report was prepared through discussion with Mr. Patrick Lam, M.Sc., P. Eng., of CWMM Consulting Engineers Ltd. (CWMM). Based upon the information received from CWMM, we understand that the project consists of removing and replacing three existing wood deck platforms and constructing a basic rain shelter at the top of the Radar Hill trail. It is intended that one of the existing wood deck platforms would be removed and the other two would be replaced to match what is existing.

The following report supersedes our 19 February 2015 submission and summarizes Levelton's materials condition assessment and geotechnical observations from a test pit adjacent to the lower northwest platform. The field work for the assessment was carried out on January 28 and 29th, 2015 by Mark Byram, P.Eng. and Eric L'Heureux of Levelton. An initial cursory review of the site conditions was completed by Don Kaluza, P.Eng. in order to develop the scope of work for the investigation.

STRUCTURE DESCRIPTION

The platforms have been labelled Top South Platform (Photo 1) and Lower Northeast Platform (Photo 2) as shown on the key plan of the appended Drawings SK-1 and SK-2. The wood deck platforms were built on existing concrete substructures located on the Radar Hill park site. The platforms consisted of 2 inch x 8 inch (50 mm x 200 mm) decking on 4 inch x 4 inch (100 mm x 100 mm) sleepers at 4 ft (1.2 m) on centre on concrete (Photo 3) or suspended above grade (Photo 4). The timber members were fastened with 1/8 inch (3.2 mm) and 3/16 inch (4.8 mm) diameter spiral nails as shown in photo 5.

SCOPE AND METHODOLOGY

In preparation of this report, Levelton carried out an overview of the site conditions. In general, Levelton noted that the majority of the area was bedrock controlled. An exception to this was at the wood platform that was located near the Kap Yong memorial monument where there appeared to be fill present on the slope adjacent to the edge of the platform.

The assessment work included the following:

- Removal of wood decking at 6 locations on Top South Platform (Deck A);
- Removal of wood decking at 2 locations on Lower North East Platform (Deck B);
- Review of condition of timber elements at test openings;
- Scanning of exposed concrete with a pachometer at test openings for reinforcement steel;
- Removal of 7 cores for concrete core logging and compressive strength testing; and
- Excavation and logging of test pit adjacent to the lower northeast deck.

At the wood platform near the Kap Yong memorial, Levelton reviewed the nature of the fill material adjacent to the platform by excavating one test holes using a mini-excavator to a depth of 2.5 metres (8ft) (Photos 6 and 7).

SUMMARY OF TESTING

Test openings were created by removing the 2 inch x 8 inch (50 mm x 200 mm) decking at two locations on the Lower Northeast Platform (Deck A) and six locations on the Top South Platform (Deck B). The removal of the decking facilitated inspection of the timber elements and the concrete below the platforms. One deck board was removed and replaced in the Top South Platform to eliminate a trip hazard. The board in the southwest corner of the platform was replaced with a section of decking from an adjacent bench (Photo 8 and 9)

TEST OPENINGS - TIMBER

Wood decay was present on the decking boards originating at checks in the wood and from the ends of the decking. The decay of wood from the end of the decking ranged from 10 to 100 mm (Photo 10). Areas of the wood structure in contact with soil were showing wood decay. The 4 inch x 4 inch (100 mm x 100 mm) sleepers were found to be generally in good condition with minimal surface softening (Photo 11). Significant organic material build-up was noted under the decking between the sleepers.

TEST OPENINGS – REINFORCEMENT LAYOUT

The slab- on-grade was scanned for the presence of reinforcing steel using a profoscope rebar detector (Photo 12). The presence of reinforcing steel was detected using the device and confirmed by coring. The slab on-grade reinforcement layout was indicated to be 10M bars @ 300 to 450 mm on centre each way at a depth ranging from 100 – 120 mm. The presence of 16M reinforcing was confirmed in the footing of the top south platform at a depth of 165 mm (6 ½ inches).

The concrete in the test openings was found to be free of significant cracking.

CORE LOGGING

The core samples were visually reviewed to catalogue the maximum size aggregate, size of reinforcing steel present and degree of consolidation. The approximate locations where core samples were taken are shown on Drawing Nos. SK-1 and SK-2. A summary table of the results is appended.

The core results show a slab on grade depth ranging from 140 mm (5.5 inches) to 165mm (6.5 inches). The footing depth for the top south platform at the southwest corner was measured to be 355 mm (14 inches). The depth of the footing of the Lower Northeast Platform was measured to be greater than 685 mm (27 inches) at the south perimeter of the structure.

The slab on grade appeared to have been placed on top of sand and gravel fill (Photo 13).

COMPRESSIVE STRENGTH

Compressive strength testing was carried out on the cores removed from the footing and slab on grade. The compressive strength test data is summarized below.

Table 1 – Summary of Compressive Strength

SAMPLE NO.	DIMENSIONS, (MM)				LOAD (kN)	STRENGTH (MPa)		REMARKS
	LENGTH		DIAM.	L/D		TESTED	CORRECTED	
	TRIM	CAP						
A1A	150	153	82	1.87	233.6	44.2	43.7	MSA - 40mm
A2A	94	100	82	1.22	280.8	53.2	49.1	MSA - 40mm
A1Ba	123	130	82	1.59	260.3	49.3	47.7	MSA - 37mm
A1Bb	125	131	82	1.60	239.9	45.4	44.0	MSA - 40mm
B1A	105	111	82	1.35	234.2	44.3	41.9	MSA - 50mm
B1B	135	141	94	1.50	297	42.8	41.1	MSA - 27mm
B2A	95	100	94	1.06	360.6	52.0	46.2	MSA - 25mm
B2B	110	116	94	1.23	343.5	49.5	45.9	MSA - 40mm
						Average	**44.9**	

CAPPING MATERIAL USED: Sulphur Compound **CONDITIONING:** Dry

Note: Samples A1Ba and A1Bb from Footing, all other samples from slab-on-grade.

TEST PIT

A test pit was excavated with a Bobcat X331 mini-excavator within suspected fill material on the north side of the platform near the Kap Yong memorial, as approximately shown on Drawing SK-2. The fill material was generally grass surfaced and sloped down to the north with a surface gradient that ranged from about 33° to 45°, as measured down from the horizontal. There were no signs of exposed bedrock in the fill area.

The test pit generally encountered:

- Approximately 150 mm of organic topsoil; overlying
- Approximately 200 mm of compact sand and gravel; overlying;
- Approximately 300 mm of compact 75 mm angular gravel with sand; overlying
- Angular cobble and boulder (up to 450 mm in diameter) sized rock pieces.

The test pit was terminated within the coarse, angular rock fill at a depth of about 2.5 m below grade. No groundwater was observed within the test pit. Upon completion, the test pit was backfilled with excavated spoil material and generally graded to match the surrounding grade.

SUMMARY

The compressive strength testing indicates an in place concrete with an average compressive strength of 45 MPa. The concrete appears well consolidated and contained reinforcing steel. The concrete structure appeared sound without signs of distress.

The sleepers appeared to be in good condition in the vicinity of the test openings. A large portion may be salvageable which can be further assessed once the decking has been removed. For the purpose of the deck replacement, it is recommended that a lump sum and per unit replacement cost for the wood sleepers be requested in the request for proposal.

In general, at least part of the northeast platform where the test pit was excavated is supported on top of granular fill material. The fill looked well compacted and there were no visible signs that would indicate that the fill had moved or creeped downslope. There were also no signs of consolidation settlement that may be associated with soft natural soils below the fill. The intent of the test pit exercise was to assess the nature of the existing fill for the purpose of statically supporting the re-built platform. Based upon Levelton's observations, the fill material in the area of the northeast platform would be capable of providing this support.

Assuming that all existing compact granular fill is founded directly atop of undisturbed sound bedrock, a preliminary allowable bearing pressure of 50 kPa can be used for lightly loaded shallow foundations at each site location. This assumption is based upon Levelton reviewing the overall bearing conditions and concrete elements once the old structure is removed. Levelton also recommends that we review final plans that are prepared by the design team such that the intent of this letter can be verified.

CLOSING

This letter has been prepared for Parks Canada in accordance with that attached Terms of Reference for Geotechnical Reports. CWMM Consulting Engineers Ltd. are considered to be approved users of this report subject to the terms of our contract with Parks Canada for this project.

We trust this meets your current requirements. Please contact us if you require anything further. Thank you for retaining Levelton.

Yours truly,
Levelton Consultants Ltd.

<Signature on file>

Per: Mark Byram, P.Eng.
Group Leader, VI Materials Engineering
Materials Division, BC Region
Email: mbyram@levelton.com

Reviewed by

<Signature on file>

Per: Don Kaluza, P.Eng
Group Leader, VI Geotechnical Engineering
Geotechnical Division, BC Region
Email: dkaluza@levelton.com

Attachments: Appendix I – Photographs
Appendix II – Concrete Core Log
Appendix III – Marked up Drawing

APPENDIX I

PHOTOGRAPHS

Photo 1 - Top South Platform scanning for reinforcement at location A1.

Photo 2 - Lower Northeast Platform – Excavator approaching deck

Photo 3 – Typical platform construction with sleeper in direct contact with footing / slab on grade.

Photo 4 – Supports in area of suspended deck.

Photo 5 – Fasteners at spacer below top rail.

Photo 6 and 7 – Excavator with material removed from test pit and exposed rock fill within the top 1.2 m.

Photo 8 – Trip hazard in top south platform southwest corner.

Photo 9 – Trip hazard in top south platform southwest corner removed after replacement of board.

Photo 10 – Decay of decking boards ranged from 10 to 100 mm.

Photo 11 – Timber sleepers typically in good condition in test opening areas.

Photo 12 – Profoscope scanning of slab on grade.

Photo 13 – Material below core hole in slab on grade.

APPENDIX II

CONCRETE CORE LOG

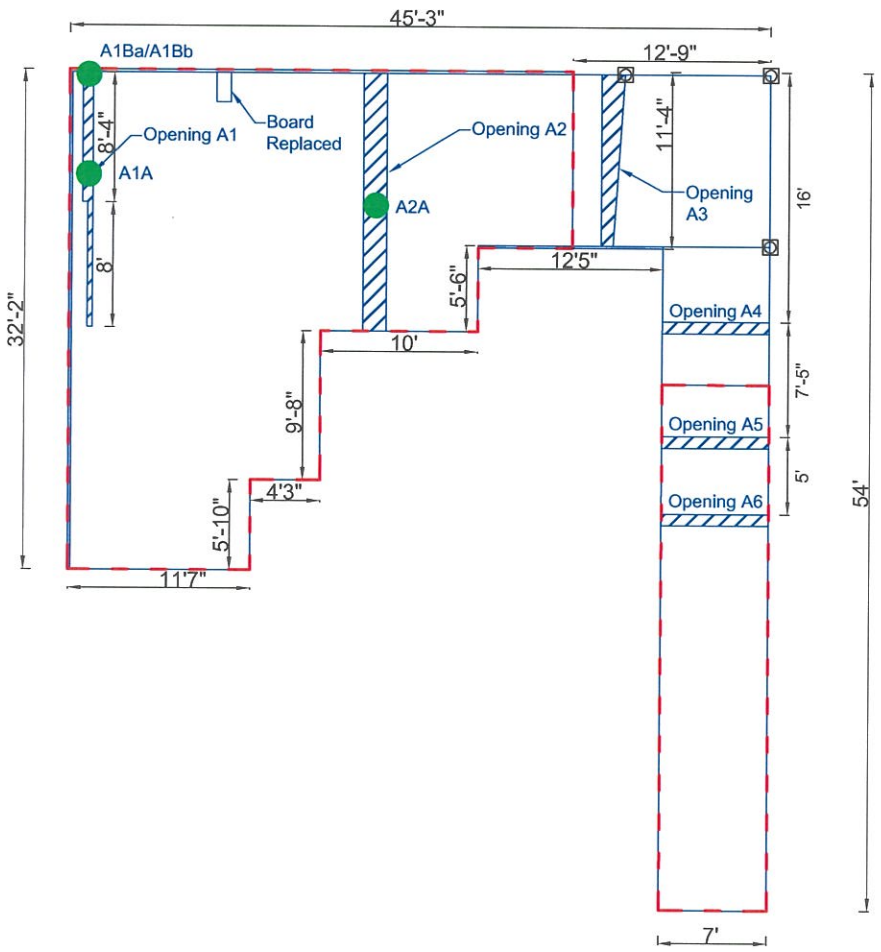
R715-0205-00 - Radar Hill Shelter and Lookout
Core Log

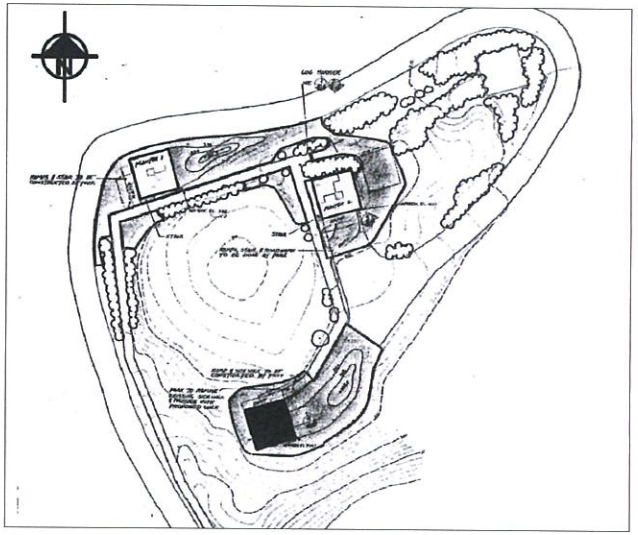
A1A – Slab on Grade L – 165 mm d – 82 mm MSA – 40 mm Minimal Air Voids Well encapsulated aggregate Full depth core	A2A – Slab on Grade L – 140 mm d – 82 mm MSA – 40 mm Medium amount of air voids Well encapsulated aggregate Porous aggregate Rebar nicked at 100mm depth (10M bar)
A1B (broke in two at rebar)	
A1Ba - Footing L – 180 mm d – 82 mm MSA – 37 mm Minimal Air Voids Well encapsulated aggregate Some porous aggregate Rebar cut through at 165 mm depth - 16M bar x2, side by side in core	A1Bb - Footing L – 175 mm d – 82 mm MSA – 40 mm Minimal Air Voids Well encapsulated aggregate Some porous aggregate Rebar of A1Ba at top of core
B1A – Slab on Grade L – 115 mm d – 82 mm MSA – 50 mm Minimal Air Voids Well encapsulated aggregate Some porous aggregate Coring stopped when hit bar; broke off above bar at 50mm aggregate	B1B – Slab on Grade L – 155 mm d – 94 mm MSA – 27 mm Minimal Air Voids Well encapsulated aggregate Some porous aggregate Full depth
B2A – Slab on Grade L – 110 mm d – 94 mm MSA – 25 mm Medium Air Voids Well encapsulated aggregate Some porous aggregate Rebar hit at 100 mm depth (10M bar)	B2B – Slab on Grade L – 140 mm d – 94 mm MSA – 40 mm Medium Air Voids Well encapsulated aggregate Few porous aggregate Full Depth Rebar cut through at 120 mm depth (10M bar)

APPENDIX III

MARKED-UP DRAWINGS

Top South Platform





KEY PLAN

LEGEND:

- SUPPORTS
- EXTENT OF CONCRETE SLAB ON GRADE
- APPROXIMATE LOCATION OF CORE HOLES

NOTE: ALL MEASUREMENTS ARE APPROXIMATE.

REV.:	DESCRIPTION:	DATE: (M/D/YR)
1	ISSUED FOR FINAL	02/27/2015
0	ISSUED FOR CLIENT REVIEW	02/19/2015

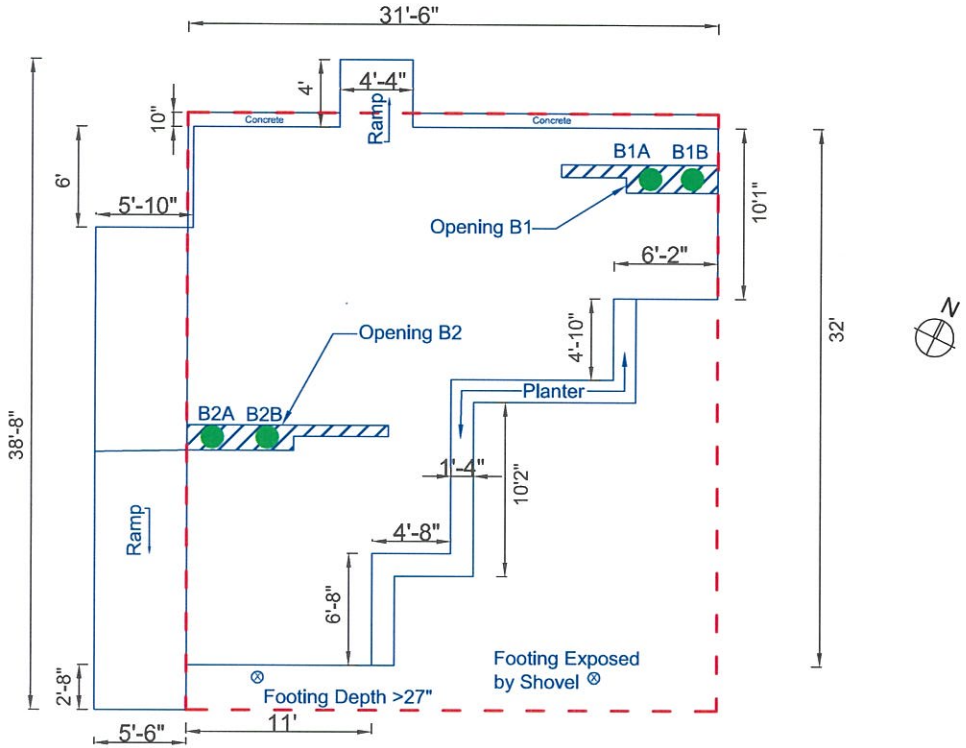
PROJECT: RADAR HILL ASSESSMENT
CLIENT: PUBLIC WORKS AND GOVERNMENT SERVICES
TITLE: DECK CONDITION ASSESSMENT - TOP SOUTH PLATFORM

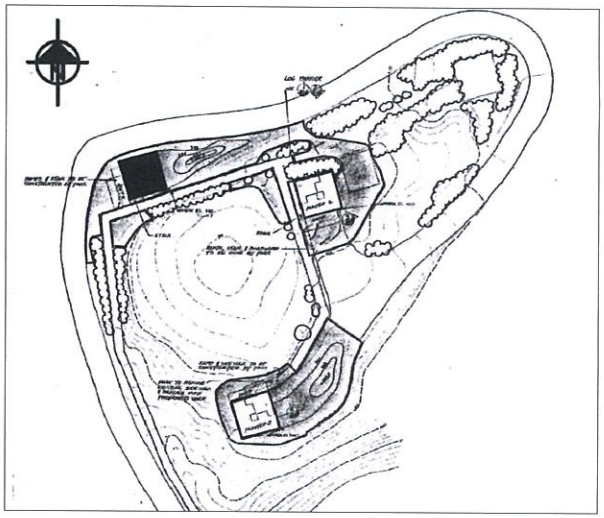
DATE: FEB 2014
DESIGN BY: MB
DRAWN BY: AM
CHECKED BY: MB
SCALE: NTS
PROJECT No.: R715-0205-01
DRAWING NO.: SK 1

LEVELTON

Lower North East Platform

Approximate Test Pit Location(See Test Pit Log)





KEY PLAN

LEGEND:

- EXCAVATION LOCATION
- APPROXIMATE LOCATION OF CORE HOLES
- EXTENT OF CONCRETE FOOTING & SLAB ON GRADE

NOTE: ALL MEASUREMENTS ARE APPROXIMATE.

REV. :	DESCRIPTION:	DATE : (M/D/YR)
1	ISSUED FOR FINAL	02/27/2015
0	ISSUED FOR CLIENT REVIEW	02/19/2015

PROJECT: RADAR HILL ASSESSMENT

CLIENT: PUBLIC WORKS AND GOVERNMENT SERVICES

TITLE: DECK CONDITION ASSESSMENT - LOWER NORTH EAST PLATFORM

DATE:	FEB 2014
DESIGN BY:	MB
DRAWN BY:	AM
CHECKED BY:	MB
SCALE:	NTS
PROJECT No.:	R715-0205-01
DRAWING NO.:	SK 2

LEVELTON