END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures.

.2 Section 01 14 00 – Work Restrictions.

.3 Government of Canada, Standard Acquisition Clauses and Conditions (SACC) Manual R2850D GC 5.10

.4 Appendices

.1 Appendix A – Site location/Site Plans

.2 Appendix B - Design Drawings/ Repair Details - Cambrian Pool

1.2 DEFINITIONS

.1 Departmental Representative: Within the context of these specifications, this refers to the person exercising the roles and attributes of Canada under the contract. Parks Canada Agency will be fulfilling the role of Departmental Representative for this Contract.

.2 Owner: For the purpose of this Contract, the Owner is the Parks Canada Agency, who operates the site.

.3 Contractor: The contractor to undertake the site management and operation services defined, within the context of these specifications, as the Contractor.

1.3 PROJECT LOCATION

.1 Parks Canada Administration Grounds. See appendix A for location and site details.

.2 The objective of this project is to:

.1 Complete stone masonry and concrete repairs on historical garden pools. See appendix B for design details/drawings.

1.4 WORKMANSHIP AND QUALIFICATIONS

.1 All masonry work shall be carried out by a masonry contractor/ company trained and experienced in this type of work.

1.5 PROJECT SCHEDULE

.1 It is imperative that this work be completed by Sept 15, 2014.

.2 The contractor is expected to have enough resources to complete the project on time .

1.6 WORK COVERED BY CONTRACT DOCUMENTS

.1 Clean the stones in-situ.

.2 Remove Stones in "Columns" and store on individual numbered pallets such that they can be re-installed in the same location and in the same order. The historic photographs of the original stone patterns are to be used as a guide for the final placement / pattern of the stones.

.3 Remove the existing sand bed, plastic liner and concrete slab.

.4 Clean the existing concrete walls to expose

.1 Delamination - Corrosion of Mesh

.2 Honeycomb in Original

.3 Crack

.1 original cold joints

.2 movement; thermal & loads

.3 tree roots

.5 Complete four core samples on wall at locations as determined by structural engineer.

.6 Prepare existing concrete surface and complete local repairs to concrete.

.7 Excavate and install free draining compacted granular back fill and weeping tile system with sumps. Clean / verify existing drain lines and overflow line are open to ensure they are operational. Install the new concrete pool basin floor slab.

.8 Install fully bonded seamless waterproof membrane.

.9 Flood test pool after membrane has cured – 24 hour test to verify no leakage.

.10 Install protection layer on slab.

.11 Replace stone from numbered pallets - set in mortar with deep raked joint. Replace ground layer fill and feature stones on the slab.

.12 Refill pool with water and verify installation.

.13 In preparation for and during construction of this project the Contractor must meet the requirements of Section 01 35 43 – Environmental Procedures to ensure the desired minimal adverse effects are achieved. Prior to the commencement of construction the Contractor must provide written confirmation that he has read and understood and will comply with all mitigations of Section 01 35 43 – Environmental Procedures .

1.7 CONTRACT METHOD

.1 Construct Work under lump sum price contract.

1.8 WORK BY OTHERS

.1 Where it is necessary that work is to proceed in areas of this project common to both the Contractor and forces of others, the Contractor shall cooperate with the other Contractors and the Owner in reviewing their construction schedules, sharing his work space, and shall coordinate his operations with the other Contractors, including traffic management and construction staging.

1.9 WORK SEQUENCE

.1 Complete all work by Sept 15, 2014.

.2 Maintain fire access/control.

1.10 CONTRACTOR USE OF PREMISES

.1 Contractor has unrestricted use of site subject to Section 01 14 00 and until the Contract Completion date.

.2 Notwithstanding SACC R2850D - GC 5.10, the Contractor shall be permitted to occupy sites where he will be working free of charge from the date of award of the contract up to and including the completion date of Sept 15, 2014. The sites to be occupied by the Contractor include all the roads and areas specified in this contract and as directed by the Departmental Representative. (see appendix A- site location/ site plan)

.3 The Contractor's occupancy of the site will be deemed to have ended, when both of the following conditions are met to the satisfaction of Parks Canada:

.1 All the work identified under this contract, has been completed.

.2 All site clean up and any outstanding deficiencies have been addressed to the satisfaction of the Departmental Representative.

.4 Contractor shall limit use of premises for Work, for storage, and for access, to allow:

.1 Owner occupancy.

.2 Work by other Contractors.

.5 Coordinate use of premises under direction of the Departmental Representative.

1.11 WARRANTY

.1 All work and materials will be warranted for a period of one year after completion date.

1.12 DOCUMENTS REQUIRED

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

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders.

.5 Other Modifications to Contract.

.6 Copy of Approved Work Schedule.

.7 Health and Safety Plan and Other Safety Related Documents.

.8 Other documents as specified.

1.13 CONSTRUCTION SIGNAGE

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

.2 Signs and notices for safety and instruction shall be in both official languages. Signs shall be diamond grade and shall conform to CAN3-Z321.

.3 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 00.06 – Special Procedures for Traffic Control.

.2 Section 01 35 43 – Environmental Procedures.

1.2 USE OF SITE AND FACILITIES

.1 The Work Site limits will be specified by Parks Canada and shall only be used for the purposes of the Work. The Work Site will be made available by Parks Canada to the Contractor for its non-exclusive use for the duration of the Work, unless otherwise provided in the Contract Documents.

.2 Office-tool trailer may be set up at site.

.3 The Contractor shall keep the Work Site clean and free from accumulation of waste materials and rubbish regardless of source. Snow shall be removed by the Contractor as necessary and at his cost for the performance and inspection of the Work.

.4 The Contractor shall provide sanitary facilities for work force in accordance with governing regulations and the Environmental Procedures for this project. The Contractor shall post notices and take such precautions as required by local health authorities and keep area and premises in sanitary condition.

.5 Any damage to the Work Site caused by the Contractor shall be repaired by the Contractor at its expense.

.6 The Contractor may work from dawn to dusk, Monday to Thursday. There may be restricted hours for work Friday to Sunday.

1.3 WORK CONDUCTED OVER OR ADJACENT TO WATERWAYS

.1 All components of the Work shall be conducted in accordance with Section 01 35 43 – Environmental Procedures and the Environmental Protection Plan prepared for the project.

.2 All components of the Work shall be conducted without equipment entering into wetlands, water bodies, or streams without approval from the Departmental Representative.

.3 Refer to Section 01 35 43 – Environmental Procedures, for details.

.4 All waste materials from the Work shall be contained and collected in a manner to prevent any contact with the river valleys and waterways. All collected waste materials shall be disposed of in accordance with Section 01 35 43 – Environmental Procedures.

.5 The Contractor is responsible for the development and supply of construction access to the Work as approved by the Departmental Representative.

1.4 ACCESS TO ADJACENT PROPERTIES

.1 Construction operations shall be conducted so as to cause minimal inconvenience to the public.

1.5 SURVEY OF EXISTING PROPERTY CONDITIONS

.1 Submission of tender is deemed to be confirmation that the Contractor has inspected the site and is conversant with all conditions affecting execution and completion of work.

.2 The Contractor shall regularly monitor the condition of the Work Site and of property on and adjoining the Work Site throughout the construction period, and shall immediately notify the Owner if any deterioration in condition is detected. Such monitoring shall cover all pertinent features and property including, but not limited to, buildings, structures, roads, walls, fences, slopes, sewers, culverts and landscaped areas.

1.6 PROTECTION OF PERSONS AND PROPERTY

.1 Comply with all applicable safety regulations of the Workers' Compensation Board of Alberta (WCB) including, but not limited to, WCB's Industrial Health and Safety Regulations, Industrial First Aid Regulations, and Workplace Hazardous Materials Information System Regulations.

.2 The Contractor shall take all necessary precautions and measures to prevent injury or damage to persons and property on or near the Work Site.

.3 The Contractor shall promptly take such measures as are required to repair, replace or compensate for any loss or damage caused by the Contractor to any property or, if Parks Canada so directs, shall promptly reimburse to Parks Canada the costs resulting from such loss or damage.

1.7 USE OF PUBLIC AREAS

.1 Flag persons shall be provided when vehicles are entering or exiting Worksite access points.

.2 The Contractor shall ensure that its vehicles and equipment do not cause nuisance in public areas. All vehicles and equipment leaving the Work Site and entering public roadways shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. All vehicles arriving at or leaving the Work Site and transporting materials shall be loaded in a manner which will prevent dropping of materials or debris on the roadways, and where contents may otherwise be blown off during transit such loads shall be covered by tarpaulins or other suitable covers. Spills of materials in public areas shall be removed or cleaned immediately by the Contractor at no cost to the Owner. All activities shall be in accordance with Section 01 35 43.

1.8 SUPERVISORY PERSONNEL

.1 In accordance with Government of Canada GC 2.6 R28Z0D, within five Days after award notification, the Contractor shall submit to the Departmental Representative confirmation of the names of the supervisory personnel and other key staff designated for assignment on the Contract.

.2 The following personnel shall be included in the list:

.1 Project Superintendent.

.2 Safety Representative.

.3 The above personnel shall perform the following duties:

.1 The Project Superintendent shall be employed full time and shall be present on the Work Site each and every workday that Work is being performed, from the commencement of Work to Total Performance of the Work.

.2 The Project Superintendent shall nominate a Deputy Project Superintendent who shall have the authority of the Project Superintendent during the latter's absence.

.3 The Safety Representative shall possess safety experience in general construction. Duties shall encompass all matters of safety activities from commencement of Work until the Total Performance of the Work.

1.9 MEETINGS

.1 The Work includes attending meetings between the Contractor and the Departmental Representative. The meetings will be called and chaired by the Departmental Representative as required. The Contractor shall be represented at such meetings to the satisfaction of the Departmental Representative.

.2 The Departmental Representative will schedule an initial meeting to be held on site after award notification. Senior representatives of the Owner, Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors are to be in attendance.

1.10 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work.

.2 Section 01 35 00.06 – Special Procedures for Traffic Control.

1.2 DESCRIPTION

.1 Mobilization and Demobilization consists of preparatory work and operations including but not limited to, those necessary for the movement of personnel, equipment, camp, buildings, shops, offices, supplies and incidentals to and from the project site. Mobilization and Demobilization further consists of all traffic control requirements as provided in Section 01 35 00.06 – Special Procedures for Traffic Control.

1.3 MEASUREMENT PROCEDURES

.1 Mobilization and Demobilization:

.1 50% of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete.

.2 The remainder of the Lump Sum Price for Mobilization and Demobilization to be paid after Contract Completion and the site has been cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 11 00 – Summary of Work.

.2 Section 01 14 00 – Work Restrictions.

.3 Section 01 33 00 – Submittal Procedures.

.4 Section 01 35 43 – Environmental Procedures.

.5 Section 01 45 00 – Quality Control.

.6 Section 01 52 00 – Construction Facilities.

.7 Section 01 77 00 – Close out Procedures.

1.2 MEASUREMENT PROCEDURES

.1 This Work shall be incidental to the contract and will not be measured for payment.

1.3 COORDINATION

.1 Perform coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work, with progress of Work of other Contractors, and Work by Owner, under instructions of the Departmental Representative.

1.4 PROJECT MEETINGS

.1 Attend project meetings throughout progress of Work and provide information as determined by the Departmental Representative. Meetings shall be chaired by the Departmental Representative who will prepare the minutes of the meetings.

.2 Attend pre-installation meetings, when specified in specifications and when required to coordinate related or affected Work and provide information, as determined by the Departmental Representative.

1.5 CONSTRUCTION ORGANIZATION AND START UP

.1 Within five (5) days after award of Contract, request a meeting of Contract Representatives to discuss and resolve administrative procedures and responsibilities. Meeting shall be chaired by the Departmental Representative who will prepare the minutes of the meeting.

.2 Senior representatives of the Owner, Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors are to be in attendance.

.3 Agenda to include following:

.1 Appointment of official representative of participants in Work.

.2 Schedule of Work.

.3 Schedule of submittals in accordance with Section 01 33 00.

.4 Requirements for temporary facilities, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.

.5 Site safety and security in accordance with Sections 01 14 00, 01 52 00 and 01 35 43.

.6 Quality Control in accordance with Section 01 45 00.

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

.8 Owner-furnished materials.

.9 Monthly progress claims, administrative procedures, photographs, and holdbacks.

.10 Close out procedures and submittals in accordance with Sections 01 77 00 and 01 78 00.

.11 Insurances and transcript of policies.

.12 Other business.

.4 Comply with Departmental Representative's allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.

.5 During construction, coordinate use of site and facilities through Departmental Representative's procedures for intra project communications: Submittals, reports and records, schedules, coordination of Drawings, recommendations, and resolution of ambiguities and conflicts.

.6 Comply with instructions of the Departmental Representative for use of temporary utilities and construction facilities.

.7 Coordinate field engineering and layout work with the Departmental Representative.

1.6 ON SITE DOCUMENTS

.1 Maintain at job site, one copy each of the following:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders.

.5 Other modifications to Contract.

.6 Traffic Management Plan.

.7 Safety Plan.

.8 Copy of approved Work schedule and most recent updated schedule.

.9 Notice of Project.

1.7 PROJECT SCHEDULES

.1 Submit preliminary construction progress schedule to Departmental Representative

.2 During progress of Work revise and resubmit as directed by the Departmental Representative.

1.8 CONSTRUCTION PROGRESS MEETINGS

.1 During course of Work prior to project completion, schedule progress meetings as required by Departmental Representative.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance. Meetings shall be chaired by the Departmental Representative who will prepare the minutes of the meetings.

1.9 SUBMITTALS

.1 Submit product data to Section 01 33 00 for review for compliance with Contract Documents.

.2 Submit requests for payment for review, and for transmittal to Departmental Representative. Payment request on last day of the month.

.3 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.

.4 Process substitutions through Departmental Representative.

.5 Process change orders through Departmental Representative.

.6 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative.

1.10 CLOSEOUT PROCEDURES

.1 Notify Departmental Representative when Work is considered ready for Substantial Performance.

.2 Accompany Departmental Representative on preliminary inspection to determine items listed for completion or correction.

.3 Comply with Departmental Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.4 Notify Departmental Representative of instructions for completion of items of Work determined in Departmental Representative's final inspection.

.5 Schedule project meetings at the call of Departmental Representative.

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

.7 Note that the Departmental Representative will be responsible for preparing agenda for meetings, notification of meeting dates and recording meeting minutes.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 14 00 – Work Restrictions.

.2 Section 01 35 00.06 – Special Procedures for Traffic Control.

.3 Section 01 35 29.06 – Health and Safety Requirements.

.4 Section 01 35 43 – Environmental Procedures.

.5 Section 01 45 00 – Quality Control.

.6 Section 01 78 00 – Closeout Submittals.

1.2 MEASUREMENT PROCEDURES

.1 This work shall be incidental to contract and will not be measured for payment.

1.3 REFERENCES

.1 Not Used.

1.4 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

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

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

.5 Notify Departmental Representative in writing at time of submission, identifying any deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent Work is consistent.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative’s review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

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

1.5 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

1.6 REQUIRED CONTRACTOR SUBMITTALS

.1 General

.1 This Clause identifies the plans, programs, and documentation required prior to mobilization on site and during the construction phase.

.2 Pre-Mobilization Submittals: The Contractor shall not begin any site Work until the Departmental Representative has authorized acceptance of submittals . Submit the following plans and programs to the Departmental Representative for review prior to mobilization to the project site:

.1 Project schedule.

.2 List of subcontractors, suppliers and consultants, their role and their key personnel, including names and positions, addresses, telephone and cellular telephone numbers, as requested by Departmental Representative .

.3 Plan describing methods the Contractor will have to meet his responsibilities as the Prime Contractor for Traffic Control in the Work zones.

.4 Contractor Chain of Command, listing key Contractor personnel, including for each name, position, qualification, experience, telephone, cellular telephone and numbers. The list shall include the names and telephone/cellular telephone numbers for contact persons who are available on a 24-hour basis in the event of emergencies.

.5 Contractor shall develop an “Emergency Procedures Protocol” in consultation with Parks Canada.

.3 Construction Phase Submittals

.1 Progress Reports that outline the detailed Work (Contractor, subcontractors, suppliers, consultants) completed to date as well as the anticipated Work to be performed for the following week. Also, alternate Work to be identified if Work or a portion of, proposed cannot be done due to weather, equipment breakdown, delays in delivery, etc.

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

.3 Submit copies of incident and accident reports.

.4 The Contractor shall not construe the Departmental Representative’s authorization of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Authorization of the programs shall not relieve the Contractor from the responsibility to conduct the Work in strict accordance with the requirements of Federal or Provincial regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor shall remain solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All Division 01, 02 and 03 Sections.

1.2 MEASUREMENT PROCEDURES

.1 Cost of Traffic Control shall be considered incidental to "Lump Sum Price Item 1 – Mobilization and Demobilization", and no additional payment will be made for the duration of the Contract.

.2 Cost of snow removal for Contractor to do the work identified in the Contract while Contractor is on site shall be considered incidental to "Lump Sum Price Item 1 – Mobilization and Demobilization", and no additional payment will be made for the duration of the Contract. This excludes snow removal on Public roads.

1.3 REFERENCES

.1 The Contractor shall provide traffic control in accordance with current edition of:

.1 Alberta Transportation – Traffic Accommodation in Work Zones.

.2 Manual of Uniform Traffic Control Devices for Canada, (MUTCD) distributed by Transportation Association of Canada.

1.4 QUALITY CONTROL

.1 All Quality Control by the Contractor.

1.5 GENERAL

.1 The Contractor shall develop and implement a Traffic Management Plan in accordance with the requirements of the current edition of the AT - Traffic Accommodation in Work Zones, except where specified otherwise. The Traffic Management Plan will include plans specific to each detour and access point required for this project.

.2 The Contractor shall design, supply, erect, move and maintain all traffic control devices, signs, temporary pavement marking, other safety measures and provide staff to ensure safe passage of all traffic from commencement of site work to date of acceptance by the Departmental Representative.

.3 All traffic and warning signs shall be either bilingual or of a symbolic or pictorial type. If bilingual signs are used, the English and French message shall be of equal letter size and at same elevation, with English on left and French on right. Assistance in translation of construction and warning signs to French may be obtained from Parks Canada.

.4 The Contractor shall coordinate traffic management procedures with other Contractors working in the area.

1.6 PROTECTION AND MAINTENANCE OF TRAFFIC

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

.2 Maintain access and haul roads as necessary.

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

.4 Provide snow removal during period of Work.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 14 00 – Work Restrictions.

.2 Section 01 33 00 – Submittal Procedures.

.3 Section 01 35 43 – Environmental Procedures.

.4 Section 01 41 00 – Regulatory Requirements.

.5 Section 02 81 01 – Hazardous Materials.

1.2 MEASUREMENT PROCEDURES

.1 This work shall be incidental to contract and will not be measured for payment.

1.3 REFERENCES

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

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Province of Alberta

.1 Occupational Health and Safety Act, R.S.A. 2000.

1.4 SUBMITTALS

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

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

.3 Submit copies of incident and accident reports.

.4 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

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

1.5 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

.2 Parks Canada recognizes that federal Occupational Health and Safety legislation places specific responsibilities upon Parks Canada as owner of the work place. In order to meet those requirements, Parks Canada has implemented a contractor safety regime to ensure roles and responsibilities assigned under Part II of the Canada Labour Code and the Canada Occupational Health and Safety Regulations are implemented and observed when involving contractor(s) to undertake work in Parks Canada work places, including on Parks Canada property.

.3 After contract award and prior to commencement of any work under the contract, the Project Manager will hold a health and safety meeting with the Contractor. At this

meeting, the Contractor is required to complete and sign an Attestation to certify the Contractor will comply with the requirements set out in the Attestation and the terms and conditions of the contract.

1.6 SAFETY ASSESSMENT

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

1.7 MEETINGS

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

1.8 REGULATORY REQUIREMENTS

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

1.9 PROJECT/SITE CONDITIONS

1.10 GENERAL REQUIREMENTS

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

1.11 RESPONSIBILITY

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

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

1.12 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta.

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

1.13 UNFORSEEN HAZARDS

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

1.14 HEALTH AND SAFETY CO-ORDINATOR

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

.1 Have site-related working experience specific to activities associated with earthworks.

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

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

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

.5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.15 CORRECTION OF NON-COMPLIANCE

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

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

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All Divisions 01, 02, 31, 32, and 35 Sections.

1.2 SUBMITTALS

.1 Prior to the commencement of construction the Contractor must provide written confirmation that he has read and understood and will comply with environmental procedures as outlined in this section 01 35 43-Environmental Procedures.

1.3 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

.1 Execution of the work is subject to the provisions within the *Canadian Environmental Assessment Act* (CEAA) Guidelines Order of 2012, subsequent amendments, and Parks Canada's Interim Directive on Implementation of the Canadian Environmental Assessment Act 2012.

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

1.4 MONITORING

.1 Parks Canada will have an ESO or alternate designated Parks Canada staff member attending the site to monitor the construction activity for conformance with the Environmental Procedures. The ESO's main duties are to monitor the progress of the construction on an on-going basis to ensure compliance with environmental protection measures, and to provide guidance through the Departmental Representative, in the event of unanticipated environmental problems.

1.5 CONSTRUCTION SITE ACCESS AND PARKING

.1 In consultation with the Departmental Representative, the Contractor shall formulate an agreement for worker transportation to and from the work sites and where workers shall park their private vehicles. Generally, personal vehicles shall be parked at least 10 metres distance from any watercourse.

.2 The Contractor shall ensure that the environment beyond the work limits is not negatively impacted or damaged by workers' vehicles or construction machinery and shall instruct workers so that the "footprint" of the project is kept within defined boundaries.

1.6 EROSION CONTROL

.1 Erosion control measures that prevent sediment from entering any waterway, water body or wetland in the vicinity of the construction site are a critical element of the project and shall be implemented by the Contractor.

.2 If necessary, on-site sediment control measures shall be constructed and functional prior to initiating activities. If required, the Contractor shall prepare an Erosion Control Plan to the satisfaction of the Departmental Representative and the ESO.

.3 The regular monitoring and maintenance of all erosion control measures shall be the responsibility of the Contractor. If the design of the control measures is not functioning

effectively they are to be repaired. The Departmental Representative and ESO also will monitor erosion control performance.

.4 The site will be secured against erosion during any periods of construction inactivity or shutdown.

1.7 POLLUTION CONTROL

.1 The Contractor shall prevent any deleterious and objectionable materials from entering streams, rivers, wetlands, water bodies or watercourses that would result in damage to aquatic and riparian habitat. Hazardous or toxic products shall be stored no closer than 30 metres from watercourses.

.2 The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products shall be in accordance with all applicable federal and provincial legislation. Hazardous products shall be stored no closer than 100 metres from watercourses.

.3 The Contractor shall prevent blowing dust and debris by covering and/or providing dust control for temporary roads and on-site work by methods that are approved by the Departmental Representative or ESO.

.4 The Contractor shall provide spill kits at re-fuelling, lubrication, and repair locations that will be capable of dealing with 110% of the largest potential spill and shall be maintained in good working order on the construction site. The ESO and Departmental Representative prior to project start-up must approve these spill kits. The Contractor and site staff shall be informed of the location of the spill response kit(s) and be trained in its use.

.5 Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The Departmental Representative and the ESO shall be notified immediately of any spill.

.6 In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.

.7 The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the Contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of the Departmental Representative and ESO.

1.8 EQUIPMENT MAINTENANCE, FUELLING AND OPERATION

.1 The Contractor shall ensure that all soil, seeds and any debris attached to construction equipment to be used on the project site shall be removed (e.g. power washing) outside the Banff National Park before delivery to the work site.

.2 Equipment fuelling sites will be identified by the Contractor and approved by the Departmental Representative and the ESO. Except for chain saws, any fuelling closer than 100 metres any streams, wetlands, water bodies or waterways shall require the authorization and oversight of the Departmental Representative.

.3 Mobile fuel containers (e.g. slip tanks, small fuel carboys) shall remain in the service vehicle at all times. Protection and containment of approved fuel storage sites is addressed in # 4 of Pollution Control above.

.4 Equipment used on the project shall be fuelled with E10, and low sulfur diesel fuels and shall conform to local emission requirements. The Contractor is to ensure that unnecessary idling of vehicles is avoided.

.5 Oil changes, lubricant changes, greasing and machinery repairs shall be performed at locations approved by the ESO or the Departmental Representative. Waste lubrication products (e.g. oil filters, used containers, used oil, etc.) shall be secured in spill-proof containers and properly recycled or disposed of at an approved facility. No waste petroleum, lubricant products or related materials are to be discarded, buried or disposed of in borrow pits, turnouts, picnic areas, viewpoints, etc. anywhere within Banff National Park.

.6 The Contractor shall ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.

.7 Fuel containers and lubricant products shall be stored only in secure locations specified by the Departmental Representative. Fuel tanks or other potentially deleterious substance containers shall be secured to ensure they are tamperproof and cannot be drained by vandals when left overnight. Alternatively, the Contractor may hire a security person employed to prevent vandalism.

1.9 OPERATION OF EQUIPMENT

.1 Equipment movements shall be restricted to the 'footprint' of the construction area. The work limits shall be identified by stake and ribbon or other methods approved by the Departmental Representative. Unless authorized by the Departmental Representative, activities beyond the work limits are not permitted. No machinery will enter, work in or cross over streams, rivers, wetlands, water bodies or watercourses, nor damage aquatic and riparian habitat or trees and plant communities. Some of the construction shall require working close to watercourses or water bodies. In these instances, the Contractor is to describe measures to be employed to ensure fugitive materials (e.g. rocks, soil, branches) and especially deleterious substances (e.g. chemicals) do not enter any watercourses, to the satisfaction of the Departmental Representative and ESO.

.2 The Contractor shall instruct workers to prevent pushing, placement, raveling, storage or stockpiling of any materials (e.g. slash, rock, fill or topsoil) in the trees bordering the right-of-way or into watercourses or water bodies.

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

.4 Restrict vehicle movements to work limits.

.5 Workers private vehicles are to remain within the construction footprint.

1.10 FIRE PREVENTION AND CONTROL

.1 A fire extinguisher shall be carried and available for use on each machine and at locations within the plant in the event of fire. Contractor's staff shall receive basic training in early response to wildfire events during the "environmental briefing".

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

.3 Care shall be taken while smoking on the construction site to ensure that the accidental ignition of any flammable material is prevented. Fires or burning of waste materials is not permitted.

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

.5 Fires or burning of waste materials is not permitted.

1.11 RELICS AND ANTIQUITIES

.1 Artifacts, relics, antiquities and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets and similar objects found on the work site shall be reported to the ESO or the Departmental Representative immediately. The Contractor and workers shall wait for instructions before proceeding with their work.

.2 All historical or archaeological objects found are protected under the National Parks Act and Regulations and are the property of Parks Canada. The Contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative.

1.12 WASTE MATERIALS STORAGE AND REMOVAL

.1 The Contractor and workers shall dispose of hazardous wastes in conformance with the Environmental Contaminants Act and applicable provincial regulations while observing the Code of Good Practice for Management of Hazardous and Toxic Wastes at Federal Establishments.

.2 Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site. These wastes shall be contained and removed in a timely and approved manner by the Contractor and workers, and disposed of at an appropriate waste landfill site.

.3 A concerted effort shall be made by the Contractor and workers to reduce, reuse and recycle materials.

.4 The Contractor and workers shall immediately report any circumstances related to food/garbage (e.g. overflowing container or strong smell) and wildlife to the ESO or the Departmental Representative.

.5 Sanitary facilities, such as a portable container toilet, shall be provided by the Contractor and maintained in a clean condition.

1.13 MISCELLANEOUS SITE MANAGEMENT CONTINGENCIES

.1 If required, a Contractor’s office and work headquarters material laydown, equipment parking and storage area will be permitted at the work site.

.2 Removal and storage of snow shall be arranged with the ESO and the Departmental Representative.

.3 The Contractor shall control blowing dust and debris generated from the construction site by means such as covering or wetting down dry materials and rubbish. Dust control measures for temporary access roads may also have to be initiated.

.4 Security services at the construction site may be desirable or necessary during the contract, especially during quiet times. Fuel tanks or other potentially deleterious

substance containers must be secured by the Contractor to ensure they are tamperproof and cannot be drained by vandals at his own cost.

.5 Pets shall not be brought to or maintained at the construction site or worker's camp.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 SPECIFIC CONCERNS RELATIVE TO EROSION CONTROL AND SEDIMENTATION

.1 An important desired end result is to allow no release into watercourses of sediments in levels that are deleterious to fish or that would harmfully alter, disrupt, or destroy fish habitat. Similarly there is to be no sediment release into areas of vegetation growth or sensitive areas of sediments in levels that would adversely alter growing or hydraulic conditions.

3.2 CLEANING

.1 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 21 23 33.01 – Excavating, Trenching and Backfilling.

1.2 REFERENCES AND CODES

.1 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 CANADIAN ENVIRONMENTAL PROTECTION ACT

.1 Perform Work in accordance with Canadian Environmental Protection Act.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 All Division 01, 02 and 03 Sections.

1.2 MEASUREMENT PROCEDURES

.1 This work shall be incidental to contract and will not be measured for payment.

1.3 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.4 INDEPENDENT INSPECTION AGENCIES

.1 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Departmental Representative at no cost to the Departmental Representative.

1.5 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work.

1.6 REJECTED WORK

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 35 00.06 – Special Procedures for Traffic Control.

.2 Section 01 35 43 – Environmental Procedures.

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 SITE STORAGE/LOADING

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

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

1.5 CONSTRUCTION PARKING

.1 Provide and maintain adequate access and parking at the project site in areas approved by the Departmental Representative.

.2 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

1.7 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations, ordinances and Section 01 35 43 – Environmental Procedures.

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

1.8 CONSTRUCTION SIGNAGE

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

.2 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3 Z321.

.3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative

1.9 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide traffic control measures in accordance with Section 01 35 00.06 – Special Procedures for Traffic Control.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Complete in accordance with Sections 01 35 43.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 RELATED REQUIREMENTS

.1 Section 01 78 00 – Closeout Submittals.

1.3 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

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

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 45 00 – Quality Control.

.3 Section 01 77 00 – Closeout Procedures.

1.3 RECORDING ACTUAL SITE CONDITIONS

.1 Contractor to provide as built drawings to Departmental Representative at project completion.

.2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:

.1 Field changes of dimension and detail.

.2 Changes made by change orders.

.3 Details not on original Contract Drawings.

.4 References to related shop drawings and modifications.

1.4 WARRANTIES AND BONDS

.1 All work is to be warranted for a period of one year after all deficiencies identified during final inspection have been rectified.

Part 2 Products

2.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 61 00 – Common Product Requirements.

.3 Section 01 74 11 – Cleaning.

1.2 REFERENCES

.1 Definitions:

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

.2 Reference Standards:

.1 Canadian Environmental Protection Act,1999 (CEPA 1999)

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.2 Department of Justice Canada (Jus)

.1 Transportation of Dangerous Goods Act, 1992 (TDG Act).

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 National Research Council Canada Institute for Research in Construction (NRC-IRC)

.1 National Fire Code of Canada-2010.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.4 Storage and Handling Requirements:

.1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.

.5 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.6 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.7 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.8 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.9 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 When hazardous waste is generated on site:

.1 Co-ordinate transportation and disposal with Departmental Representative.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.

.5 Label container[s] with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Only trained personnel handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.

.9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

.12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.13 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

Part 2 Products

2.1 MATERIALS

.1 Description:

.1 Bring on site only quantities hazardous material required to perform Work.

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

Part 3 Execution

3.1 CLEANING

.1 Progress Cleaning:.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK INCLUDES

.1 Cleaning of all exposed masonry surfaces. Utilize low pressure hot water and surfactants. Manually scrub with bristle brushes. Complete a test panel for review and approval by the Minister.

.2 Cleaning of heavy soiling with rotating Vortex pressure spray with water. Complete a test panel for review and approval by the Minister.

1.2 TEST PANELS REQUIRED

.1 Cleaning Test Panel #1: utilize low pressure water, type 'B' surfactant as manufactured by Chemfax MS Cleaner, and manual brushing.

.2 Cleaning Test Panel #3: Utilize low pressure Vortex water spray with JOS/TORC equipment.

1.3 RELATED WORK

.1 Section 01 33 00 Submittal Procedures
.2 Section 01 45 00 Quality Control
.3 Section 04 03 07 Repointing Historic Masonry

1.4 SAMPLES

.1 Submit samples of all cleaning materials for approval of the Minister.

.2 Demonstrate all equipment, tools, and plant to be used on site for cleaning operations for approval of the Minister at commencement of operations.

.3 Use only approved materials and equipment on the job.

1.5 ENVIRONMENT REQUIREMENTS

.1 Do not use any water-based cleaning methods when there is a risk of frost.

.2 Allow at least one month for walls to dry after completion of project before frost risk occurs.

.3 Severe damage to masonry can occur if it freezes when saturated. Heavy walls that have been saturated can take many months to dry thoroughly, and masonry of a porous nature can be drastically weakened by saturation. Careful consideration must be given to timing of any water-based cleaning operations. Statistical freeze-up dates are available from weather offices. Most masonry can be considered dry when its relative humidity is below 25%.

.4 Do not attempt chemical cleaning of the masonry when the temperature is below 10° C.

.5 Most chemical cleaners do not work at temperatures lower than 10° C; if cleaning is attempted below this temperature excessive amounts of chemical would have to be used

and wash down would be prolonged, resulting in damage to the masonry by saturation and abrasion from water spray.

.6 Cleaning should not be done in full, hot sunlight. If necessary, shading of walls is to be provided.

.7 Hot walls cause rapid evaporation of water and solvents; this reduces the contact time of the cleaners, promotes deposition of dirt on cleaned wall areas and reduces the effectiveness of the rinsing procedure.

.8 Effluent from stripping process must be collected in steel drums, sealed and disposed at an approved disposal site. Review procedures with authority having jurisdiction.

1.6 ALTERNATIVES

.1 Unless approved in writing by the Minister in advance, there must be no changes to the materials, methods, or specified procedures.

1.7 PROTECTION

.1 All windows, doors and wall openings are to be sealed to prevent the entry of water, dust or chemicals into the building.

.2 For most cleaning operations water and dust infiltration poses a serious problem on the work site. It is vital to seal all openings with plastic sheet (6 mil), and caulk around the perimeter of the sheet till a satisfactory seal is established. Close-fitted boarding must then be installed as further protection over the sheeting. Panels should be fixed with non-ferrous screws for easy removal. Protection panels must be installed very carefully, especially when acidic cleaners are to be used.

.3 Protect all adjacent areas and adjoining materials against damage, including (but not limited to) glass breakage, damage to wooden trim, roof damage by either solvent action or puncture, staining of interior walls, or corrosion of metal trim.

.4 Water-misting sprays, as noted below, may be required to prevent chemical wind-drift damage to adjacent building finishes and plant material.

.5 Provide protection against the spread of dust, dirt, chemicals, water and residues into the environment at or beyond the work area with an approved enclosure of scaffolding and sheeting, and with water-misting sprays as required.

.6 Extra care must be taken when using chemicals, especially Hydrofluoric Acid cleaners which will etch stained glass and ceramic materials and damage painted architectural metals or nearby stationary vehicles. Pedestrians are susceptible to chemical cleaners and must be protected. Strippable latex-rubber coatings may be required to protect valuable material such as stained glass or historic floor tiles, in addition to the specified sheeting and board coverings. Open ends of scaffolding must be capped to prevent the entry of chemicals; this is to prevent internal corrosion and spillage onto workers taking down tubing.

.7 Rainwater leaders, eavestroughs and gutters should be protected from blockage by residues before work commences. Suitable protection must be installed at drains, but the normal water flow must not be restricted.

.8 Landscape material must be protected from the effects of chemicals, dusts and residues. When chemicals are used, thoroughly pre-soak adjacent shrubs, lawn and plant material and maintain moist conditions by laying soaker hoses to provide a continuous misting of water. Adjacent plant material must be protected from direct contact with chemicals.

.9 When acid cleaners are used lime-filled trenches may be necessary to absorb and neutralize acidic residue and runoff. Similarly, liming of surrounding soil should be established by testing prior to cleaning.

.10 All workmen must be protected from the effects of dusts and chemicals. The contractor must ensure that all workmen wear adequate and approved protective equipment at all times during cleaning operations.

.11 Mask adjacent materials that would be affected by over spray or runoff from chemical or water cleaning action.

.12 Where plinths or band courses need to be protected from runoff, rake out a joint immediately above the courses to be protected, using hand tools, and protect material by providing a apron of 6 mil plastic sheet secured with polyethylene rope and lead wedges set in the chase, and with clips at the lower edge, to deflect runoff.

1.8 EXISTING CONDITIONS

.1 The contractor shall report to the Minister in writing all areas of deteriorated masonry revealed during cleaning operations.

.2 Areas around severely deteriorated masonry or jointing shall not be cleaned until repairs are undertaken to consolidate the historic material and bring it up to a state where it will withstand cleaning without further damage.

1.9 SCHEDULING

.1 Submit a work schedule indicating proposed timing and extent of work.

.2 Co-ordinate work schedule with that of other trades on site.

1.10 WORKMANSHIP AND QUALIFICATIONS

.1 All masonry work shall be carried out by a masonry contractor/ company trained and experienced in this type of work.

1.11 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with the Minister's instructions.

Part 2 Products

2.1 WATER

.1 All water shall be potable, clear and free of contaminants. Water with a high iron level shall be treated before use to reduce iron content.

.2 Care should be taken when washing carbonate-based masonry such as limestone and marble with acidic water. Basic and hard water clean this class of masonry more satisfactorily because of the retarded cleaning action.

.3 All piping and fittings for cleaning operations should be plastic or non-ferrous material to minimize rust staining of masonry.

.4 Water pumps shall be fitted with accurate pressure regulators and gauges that are capable of being preset and locked at maximum specified levels. For most work specified herein a maximum working pressure of 20 psi at 4 gpm (1.3 Mpa at 18 1/m) is called for.

.5 Low or mains pressure is regarded as around 50 psi; medium pressure cleaning is 100 - 200 psi; even at this pressure, which is considered quite low by industry standards, considerable damage can be done to softer stones and bricks. Above 200 psi water acts as an abrasive on soft sedimentary stones, and must be used with extreme caution on very hard stones and polished hard surfaces such as granites.

.6 Steam is to be generated in flash boilers or other suitable approved appliance.

2.2 AIR

.1 Pressurized air is to be clean and free from oil or other contaminants.

.2 An on-line oil filter with a manual drain and pressure control gauge at the working face must be fitted to all air lines.

.3 Oil droplets sprayed onto a building at high pressure can be difficult and costly to remove. Air pressure must be regulated at the work face to compensate for drops in pressure along the line.

2.3 TOOLS AND EQUIPMENT

.1 All brushes shall be of the natural bristle or soft plastic type. Metal brushes are abrasive and are not to be used for cleaning operations.

.2 Scrapers shall be made of wood or plastic only. Metal scrapers shall not be used.

.3 Ferrous metal brushes and tools have iron particles in masonry that cause rust staining.

.4 Low pressure Vortex spray with mixture of air, fine inert granulate and water - JOS/TORC system as supplied by Stonehealth Conservation & Restoration, England. Phone (+44) 01453 540600.

2.4 SURFACTANTS

.1 Surfactants shall be of the non-ionic type for general masonry cleaning. Utilize Chemfax MS Cleaner - Chemfax Products Ltd, Calgary.

.2 Surface-active agents are used to dislodge minute insoluble particles that are tightly held to the masonry surface by molecular attraction, and allow the particles to be flushed away. Surfactants can be used alone with water in concentrations of 1 - 2% (by weight or volume), or in lesser concentrations as part of formulations with acidic, neutral or

alkaline bases. Most patent cleaning formulations contain surfactants. Detergents and soaps are surfactants. There are three types of surfactants available:

.1 Anionic Soaps and Detergents - these products require high temperatures and soft water to work effectively. They react with magnesium, calcium and iron ions to form soap curds that are difficult to remove. Most generally available detergents are of this type, and are generally not suitable for masonry cleaning.

.2 Non-Ionic Detergents - can be used with hard water at low temperature, often combined with thickeners to improve the cleaning action. Alkyl-ethylene-oxide type detergents are satisfactory for masonry cleaning in general.

.3 Cationic Cleaners - such as long-chain or fatty amines are not good general cleaners. They should not be combined with anionic cleaners as they form insoluble precipitates when combined. They are useful in acidic formulations to remove bacteriological slimes and in disinfection work. Quaternary ammonium salts can be utilized for this cleaning operation.

2.5 ACIDIC CLEANERS

.1 Only formulations based upon hydrofluoric acid (HF) should be used for cleaning acid-resistant historic masonry. A maximum concentration of 5% HF acid should be used.

.2 HF acid is the only acid that does not form dangerous soluble salts during the cleaning process. Formulations based upon hydrochloric acid (muriatic acid - HCl) should not be used. Many secret formulations are HCl-based. The formulation of hygroscopic iron chloride compounds can result in severe staining of the surface of the masonry and crystallization in the structure of the masonry, exerting considerable pressure that can be quite destructive of weak or fissured material.

.3 A small amount (approximately 0.25%) of orthophosphoric acid should be added to the compound to minimize metallic salt deposition at the surface of the masonry.

.4 Orthophosphoric acid acts as a chelating agent that sequesters metallic ions and transforms them into insoluble complexes. Thorough washing and maintenance of a constantly wet face on the masonry prevents deposition of these products on the masonry.

.5 A quantity of non-ionic surfactant may be added to most cleaners to act as a wetting agents.

.6 CAUTION: Ammonium bifluoride is not an all purpose cleaner and should not be used on calcareous materials. It is an acidic salt that produces HF acid and free ammonia along with sparingly soluble calcium fluoride. This tends to lighten the colour of the masonry and may leave deposits of ammonium salts which may lead to deterioration of the masonry. This product may be used in some circumstances where these effects are not a problem, but only after testing and with extreme caution.

2.6 INORGANIC SALTS

.1 Sodium hexametaphosphate (Calgon, or NaHMP) is an effective, neutral agent able to dissolve gypsum-bound soiling on masonry. This cleaner requires a long contact time with soiling to effectively break down the gypsum, and is usually combined with either basic or acidic compounds and surfactants to improve the cleaning action.

.2 A solution of 5% NaHMP, 0.25% ammonium formiate, 0.05% surfactant and ethanol amine to pH 9 is an effective gypsum solubilizer for use on limestone, and is combined with either a thixotropic gel or used with a recirculation system to give a long contact time with the masonry.

2.7 ALKALINE CLEANERS

.1 Ammonium hydroxide (ammonia) is a satisfactory alkaline cleaner that is safe for use on calcareous materials. Complexing agents and organic bleaches are added to give a more even final appearance to the masonry. Foaming surfactants are necessary to hold the ammonia in solution during cleaning operations.

.2 Many commercial alkaline cleaners and paint strippers are based upon sodium hydroxide (caustic soda). These should not be used on friable, weak or historic masonry because of the quantity of soluble salts that are deposited on the masonry causing destructive inflorescence and subsequent stress and decay.

2.8 ORGANIC SOLVENTS

.1 Two different types of organic solvents are available for cleaning purposes: petroleum-based solvents and synthetic solvents. Xylene, toluene, and benzene, all petroleum-based, are useful in breaking down oils and paints. Xylene is safest, toluene is more volatile and benzene is highly toxic and carcinogenic. All are flammable. Special solvents are available with high flash point such as Stoddard Solvent (380 C) and 60 C Flash Point Solvent. These do not volatilize appreciably at temperatures below their flash point and are therefore useful for poultices and gels. Synthetic solvents are mainly chlorinated hydrocarbons similar to those used for dry-cleaning solutions. These are quite poisonous and must be used with care. They are, however, non-flammable. Perchlorethylene (C2C14) is an example of a common synthetic solvent. There are many solvents available, each with its own particular qualities.

2.9 POULTICES

.1 This is a general guide to poultices; each potential application will require appropriate testing.

.2 The poultice medium should be an inert, porous material with a large surface area. Diatomaceous earth (swimming-pool-filter medium) is a readily available material. Talc and chalk could be used. It is generally mixed with a binder such as clean acid-free cotton waste that holds the paste together as it dries. Paper pulp could be used if clean and acid-free.

.3 A liquid carrier is required to dissolve the stain and carry it out of the masonry into the medium. Water is used for most chemical poultices but organic solvents are required for stains soluble only in solvents. Glycerine is used as a thickener to slow down the rate of evaporation; it sometimes improves the cleaning action of certain chemicals and surfactants.

.4 A support mechanism is required for heavy poultices to stop them falling away before the pack is completely dry. A non-ferrous or suitable plastic expanded mesh is used; it can be held against the wall with non-staining fasteners.

.5 Copper stains on siliceous material can be treated with a 10+% solution in water of sulfamic acid in a poultice pack. Copper stains on carbonate material can be treated with a 2-5% solution of ammonium carbonate in water in a poultice pack.

.6 Iron stains on siliceous material can be treated with a solution of orthophosphoric or oxalic acid, 10% by weight, and sodium salt of EDTA (ethylene diaminetetra acetic acid), 2% by weight in water. Mix into a paste poultice. Iron stains on carbonate materials can be treated with a 15% solution of sodium citrate in water, mixed 1:1 with glycerine and worked into a poultice paste.

.7 Oil and grease stains on marble can be treated with ammonium hydroxide and water in a poultice. Identify marble type and composition before general application.

.8 Heavy grease stains can be removed with a combination of petroleum solvent (20% by volume), chlorinated hydrocarbon solvent (10%) non-ionic surfactant (2%), and water (68%) mixed into a poultice.

.9 All cleaning compounds must be tested on a small area of the masonry before use.

2.10 GRINDING EQUIPMENT

.1 Grinding wheels, pneumatic hammers and chisels, and rotary teeth-grinders are NOT acceptable, and must not be used.

2.11 HEAT CLEANING

.1 Open flame heat lances and high temperature heat guns must not be used to clean historic masonry.

.2 Heat-lances used to remove or soften soiling set up considerable strains in the surface of masonry from rapid temperature differential, that lead to spalling of the surface on most materials.

2.14 BRUSHES

.1 Fibre bristle brushes only.

Part 3 Execution

3.1 PREPARATION FOR ALL METHODS

.1 Seal, pack with removable masking, or repair all defective jointing and other openings in the work area to minimize water, dust or solvent infiltration of the masonry wall.

.2 Dry brush and if necessary scrape all large accumulations of foreign matter from walls, ledges, cornices and the like. Use moderate pressure (50 psi) dry air blasts to remove as much loosely attached soil and dust as possible before commencing main cleaning operations. Care must be exercised when blasting around decorative material or extremely friable masonry.

3.2 MASONRY

.1 Wet the masonry surface soiling by soaking with a low-pressure misting system to swell and loosen soiling.

.2 Use as little water as possible; the soiling needs only to be kept moist. Avoid excessive wetting and soaking of the masonry.

.3 The time required for this operation varies considerably with the type and degree of soiling, but generally anywhere from a day to several weeks of misting is required.

.4 Use nozzles that give a nebulized droplet spray.

.5 Hand or automatic time controls can be used to provide a few seconds of spray every few minutes, depending upon the temperature, exposure and relative humidity. Nozzles can be secured to scaffolding to provide even positioning over a section of a wall. Additional nozzles should be positioned to get at heavily soiled areas under cornices and behind carved areas.

.6 Heavily soiled areas will require proportionately more soaking time than cleaner open areas.

.7 Running streams of water down wall elevations and excessive soaking of masonry is not recommended as these can cause infiltration of the wall assembly, with subsequent damage to insulation, wood framing, plaster and paint work. Insoluble salts can also be brought to the surface, causing staining and severe efflorescence; and movement of metallic ions to the surface can cause staining of the masonry. Concealed iron fittings and structural components can be seriously damaged by prolonged wetting of masonry, leading to spalling, severe staining of masonry, and structural damage. Avoid steel or iron pipes and spray heads/nozzles. General use of plastic piping and fittings is recommended.

.8 Strongly acidic water should not be used on carbonate material such as limestone, calcareous sandstones, or marble.

.9 Acidic water (or cleaner) have a rapid dissolving action on carbonate material. This can result in pitting of masonry behind resistant soiling when long periods of soaking are involved. Lime mortars are similarly affected.

.10 The details of the setup of equipment, incorporation of other related and approved cleaning methods, and degree of cleaning to be achieved should be determined at the beginning of the job during the test patch operations.

.11 Excessive cleaning of masonry or absolute insistence of an even cleaning result over all areas and types of material is not desirable. Old masonry must not be cleaned to a 'like-new' condition. Many materials develop a patina that should not be confused with built-up dirt or soiling, and that should not be removed.

.12 Brushing of heavily soiled areas with natural bristle or nylon brushes and scraping with wood or plastic tools can assist in loosening deposits and improve the action of the water misting. Considerable effort may be required with certain stains, but at all times care must be taken not to harm the worked surface of the masonry.

.13 A final rinse-down with a pressurized water spray is to be done when the soiling reaches a state that allows easy removal without overworking of the masonry surface with the gun and without damaging the masonry.

.14 Maximum water pressures should be carefully determined and controlled to prevent damage. Normally, pressures up to 200 psi at 4 gpm (1.3 Mpa at 18 1/m) are adequate to remove loosened soiling on masonry. Hard materials such as dense concrete, granites and structural glass can withstand pressures up to 600 psi at 10 gpm (4 Mpa at 45 1/m) without damage. Higher pressures are suspected as they act like abrasive blasting operations, wearing away, cavitating and pitting the surface of less durable materials. At high pressures water is driven deep into the micro- and macro-fissures of the masonry, subjecting the material to considerable internal stress.

.15 If soiling is strongly bound with siliceous material, removal of soiling with water alone will be nearly impossible. Non-calcareous or unpolished materials might respond to acidic cleaning to breakdown the binder, in combination with water washing.

.16 Acidic washing etches all surfaces to differing degrees: the cleaning action is based on the dissolving of a thin surface layer of material to loosen the soiling. Heavily soiled calcareous masonry under mouldings or cornices may require touching up with a low-pressure abrasive blast system. This must be done with caution and only as a last resort.

3.3 STEAM CLEANING

.1 Pre-soaking with water and treatment with surfactants before steam cleaning will improve the rate and quality of cleaning.

.2 Steam cleaning is also useful in removing deep-seated soiling after acid cleaning.

.3 The same precautions against frost damage and provisions for dry-out times are to be observed as for water cleaning.

.4 Gypsum-bound soiling will respond better to cold water treatment than to steam or hot water cleaning methods. Silicate-bound soiling will only respond to chemical pretreatment prior to steam cleaning.

.5 Steam is transmitted to a lance which is held by an operator a short distance from the object to be cleaned.

.6 Water is normally boiled in a flash-boiler at grade and the steam is compressed and run to the work face by a system of pipes.

.7 For work on historic masonry a 1/2" (12 mm) nozzle is used at a working pressure of between 20 - 50 psi (0.14 - 0.34 Mpa). Consideration must be given to drop in pressure in the line between compressor and work face. Harder stones and sound polished surfaces can be cleaned with nozzle pressures of up to 200 psi (1.4 Mpa) if testing determines that no damage occurs at these pressures. Normal high-pressure steam cleaning at around 500 psi (3.4 Mpa) must not be carried out on historic masonry.

.8 For greasy soiling on calcareous stones a working time of about one minute per square foot of surface should be adequate. Heavily soiled carved work will require considerably more time. Heavy soiling should be agitated by hand brushing to assist in the steam cleaning action.

.9 Steam cleaning is an extremely dangerous operation for the workmen and considerable care must be taken in providing adequate protective equipment and proper access/scaffolding.

3.4 SURFACTANT CLEANING

.1 Surfactants are usually combined with other methods of wet cleaning to assist in overcoming the surface attraction that exists between soiling and the masonry. Surfactants can be successfully used alone with medium-pressure water washing on polished surfaces, glazed brick and glazed terra cotta. Soiled masonry can be pre-soaked as specified in Part 3.2 (Water Cleaning) to swell and soften the soiling and dirt deposits.

.2 A 1 - 2% solution of surfactant in water is brushed on or sprayed at low pressure onto the masonry surface. A thick lather is formed which is brushed into the masonry to loosen and remove the soling.

.3 The masonry is then rinsed down with water at a maximum pressure of 200 psi at 4 gpm (1.3 Mpa at 18 1/m) to remove all surfactant. Repeat as required.

3.5 ACIDIC CHEMICAL CLEANING

.1 Do not use acidic cleaners on calcareous materials such as limestone, calcareous sandstone or marbles, or on glazed or polished surfaces such as glass, glazed terra-cotta, glazed brick, polished granite and the like.

.2 Test all materials to be cleaned for reactivity with acidic cleaning compounds. A simple test is to apply a few drops of muriatic acid (HCl) on the masonry. If it bubbles or foams up the surface is most likely calcareous. Alternative cleaning methods must be used. Acidic cleaners can cause considerable damage to lime-based mortars and pointing.

.3 Do not attempt acidic chemical cleaning at temperatures below 10 C.

.4 Hydrofluoric acid based cleaners do not work well below this temperature. Excessive amounts of chemical are required and proportionately greater rinsing is necessary, resulting in a greater chance of damage to the masonry face and jointing.

.5 Ensure that all adjacent surfaces are adequately protected from acid and rinse water. Guard against seepage, wind drift, and corrosion of scaffolding and swing-stage equipment. All glazed or polished surfaces adjacent to the work area must be protected from any contact with the acid cleaner. Hydrofluoric acid compounds will severely etch and stain these surfaces.

.6 All glazed areas should preferably be masked with both a strippable latex rubber spray and plastic sheeting covered with close-fitted boarding. The perimeter should be caulked to prevent seepage. This is especially important when dealing with stained glass or vitrified floor tiling.

.7 Special protective measures should be taken to ensure that workmen are protected from and are aware of the dangers of working with Hydrofluoric acid based cleaners.

.8 HF acid causes severe and slow-healing wounds that can be extremely dangerous.

.9 Pre-wet all masonry to be cleaned down to grade until the wall remains wet and water begins to flow down the wall.

.10 Cut 5% working solution 1:1 with water (add acid to water) to give 2.5% working solution; cut again 1:1 to give 1.25% solution. Test for effectiveness of weakest possible solution first.

.11 Apply cleaning solution from the bottom of the wall and work up the wall. Apply with either brushes or low-pressure spray system.

.12 Start at bottom to minimize re-deposition of cleaning residue on the wall face. This is a common cause of staining. Do not use a stronger chemical concentration than is absolutely necessary; rather, repeat the process with same concentration to achieve further cleaning effect.

.13 Follow manufacturer's recommended dwell times for particular concentrations but allow cleaning solution to remain on the masonry a maximum of ten minutes only. Ensure that wall surface remains wet. Rinse the wall from the BOTTOM and work up. When at the top rinse back down to grade. Allow to dry, and evaluate the cleaning action and any damage to masonry or pointing.

.14 Repeat process from step 5. as required.

.15 If, after drying, a whitish bloom is evident on brickwork, treatment with a weak acid cleaning solution and rinse down after complete drying of the wall should eliminate the problem.

.16 The whitish deposit is usually an amorphous silica residue that is a product of the dissolving action of the acid on the masonry.

.17 At midday break in work and at end of work day, wash down all wall areas being cleaned to remove all traces of acid. Check pH of wall to ensure neutrality.

3.6 ALKALINE CHEMICAL CLEANING

.1 Sodium hydroxide-based alkaline cleaners are not recommended for use on historic masonry of any kind.

.2 On some sound calcareous material that have been painted or are impregnated with waxy deposits, sodium hydroxide cleaners may be appropriate. The surface must be thoroughly rinsed down with a weak acetic acid solution to neutralize the base, followed by rinsing with water.

.3 Ammonium hydroxide can be used in solution with surfactants to provide an effective and relatively safe cleaning compound for use on calcareous stone.

.4 Soiling on calcareous material is usually bound to the surface with a deposit of gypsum. It is necessary to dissolve the gypsum binder to loosen the dirt particles and clean the masonry. A method currently under test in Sweden is to use sodium hexametaphosphate (NaHMP) either in a inverting (thixotropic then water soluble) gel or with a re-circulating spray system followed by a water rinse.

.5 For a gel: the wall is pre-wetted with water spray and the cleaner is sprayed onto the masonry and left to react for a period of about 5 to 30 minutes. The wall is then rinsed down with a medium pressure water spray (maximum 200 psi at 4 gpm).

.6 For a circulating spray: the cleaning solution is substituted for water in a misting spray system and re-circulated over the face of the wall until the desired degree of cleaning is achieved. The solution is collected in a plastic-lined gutter formed at the base of the wall and pumped to the top of the spray system. Similar precautions as with a water spray system must be observed. Rinse with water upon completion to remove all chemical traces.

3.7 ORGANIC SOLVENTS IN GELS AND POULTICES

.1 Organic solvents are employed to breakdown soiling that is soluble only in non-aqueous liquids; paint, grease, oils, waxes, tars, resins, some adhesives, rubbers, certain gums and lacquers, varnishes and plastics. Once broken down these soils can be emulsified with a surfactant and rinsed away with water.

.2 Proprietary methylene chloride base paint strippers in a gel form can be used to remove difficult organic stains in combination with other methods.

.3 Organic solvents are usually used with pastes, gels or poultices to minimize soaking and thus minimize transfer of soiling deeper into masonry.

.4 Paint stripper is brushed onto the soiled masonry and allowed to react for about 10 to 15 minutes. After this time most of the useful solvents are volatilized and the solvent is either re-applied or rinsed off with water and surfactant. A rinse-off pressure of 100 psi at 4 gpm (0.6 Mpa at 18 1/m) should be the maximum permitted to minimize damage to the base masonry. Hand scrubbing with soft brushes may be necessary.

.5 High pressure rinse-off acts like sandblasting and leads to cavitation of the surface.

.6 Prepare a suitable poultice paste using solvents and chemicals mixed with water and glycerine (a thickener) appropriate to the nature of the soiling.

.7 Small areas of masonry that are badly stained with material responsive to organic solvent can be treated with poultices. Suitable solvents and chemicals are mixed with an inert medium to form a thick paste. A binding agent such as cotton waste (acid-free) can be added to prevent cracking and premature dislodgment of the pack from the masonry.

.8 Pre-wet the stain area with chemical mixture only; remove as much built-up excess soiled material as possible with scrapers and absorbent material.

.9 Trowel on a 1/2" (12 mm) thick layer of paste over the stained area. Hold the paste in place with a non-ferrous mesh. Cover the pack with plastic sheeting that is neutral to the paste for a few hours to limit initial evaporation and promote dissolving of the stain. Then remove plastic sheeting and allow the pack to dry out in place. This may take up to a week.

.10 Remove pack carefully and brush area clean. Dispose of waste pack material. Repeat as required. Several applications will probably be necessary.

.11 Test cleaning action of solvents and chemicals for damage to surfaces before commencing operations. These methods can be quite drastic for use on friable masonry and great care should be exercised. It is far better to use quite weak solvent and chemical concentrations several times than to risk damage from concentrated chemical solutions. Biodegradable paint strippers are currently under development by some manufacturers to help reduce health hazards and environmental problems encountered with present products.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK INCLUDES

.1 Careful removal of stone, after it has been cleaned, in a sequential manner, placing in numbered pallets for later reinstallation in same sequence and location.

.2 Remove mortar from stones and reinstall.

.2 Repointing of salvaged stone that has been reinstalled on the pool walls.

.3 Mortar to be of intermediate strength - designation 'iii'. Joints to match existing; deep recessed concave joint.

1.2 RELATED WORK

.1 Section 01 33 00 Submittal Procedures
.2 Section 01 45 00 Quality Control
.3 Section 04 03 06 Cleaning Historic Masonry

1.3 QUALIFICATION

.1 All masonry work shall be carried out by a masonry contractor/ company trained and experienced in this type of work.

.2 The work of this section shall be executed under the continuous supervision and direction of a supervising stone mason. All work to be done by skilled and experienced tradesmen specializing in the type of work specified.

1.4 TEST PANEL

.1 Before commencement of work the contractor shall complete a 1 m^2 test panel demonstrating all aspects of the repair procedure

.2 The panel(s) shall be located as directed by the Minister.

.3 The completed panel is to be used as the standard reference for acceptance or rejection of all repointing work on the job.

.4 The test panel should be prepared under the supervision of the Minister, to ensure that a full understanding of the procedures, techniques and formulations specified is achieved before work commences.

1.5 SAMPLES

.1 Clearly labeled samples of all materials to be used on the job shall be submitted to the Minister for approval before work starts.

.2 The approved samples shall become the standard materials used on the job. Substitutions shall not be permitted without written approval from the Minister

1.6 STORAGE AND HANDLING OF MATERIALS

.1 Store cementitious materials in accordance with CSA A5. Store aggregates in accordance with CSA A23.

.2 All materials are to be kept dry and protected from weather and contamination. Masonry units are to be stacked on pallets.

.3 Manufacturer's labels and seals must be intact upon delivery.

.4 Any material that has deteriorated or has been contaminated shall not be incorporated into the work, and must be removed from the site.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 All materials must be kept above $4^{o}C$ ($40^{o}F$).

.2 No mortar may be placed when the temperature is below $0^{o}C$ ($32^{o}F$), or below $4^{o}C$ ($40^{o}F$) and falling. Repointing must not be done at temperatures above $27^{o}C$ ($80^{o}F$) unless shading and water-misted burlap over new work is provided.

.3 All work must be suspended during frosty weather unless a heated enclosure is provided. Work should not be done in full sun at temperatures above 27 C^{o} unless shading of the wall is provided and the masonry wall temperature is kept below this point. Burlap sacking and water misting may be necessary to control evaporation. High temperatures can cause flash setting of cements and rapid evaporation of water in the mix, leading to lack of development of final strength by the cement.

.4 All newly laid masonry mortar shall be protected against freezing until it is set and dry.

.5 The initial set of lime putty takes at least three days; mortar should be allowed to dry out slowly after this time. Enclosure and temporary heating may be required to prevent freezing.

1.8 PROTECTION

.1 All methods of enclosure and protection shall be to the approval of the Minister.

.2 Newly laid mortar shall be protected from excessive exposure to rain and full sunlight until the surface is thumb-print hardened.

.3 Provide and maintain protection for masonry walls at all times when work is suspended to prevent water from entering partially re-pointed masonry.

.4 Protection shall consist of non-staining plastic sheets, tarpaulins or burlap, secured to prevent lifting in high winds.

.5 Provide protection boards to exposed corners, vulnerable decorative work and all openings such as doors and windows which may be damaged by construction activities. Maintain protection for the duration of operations. Remove and dispose of protective material as directed by the Minister.

.6 Rainwater leaders, eavetroughs and gutters shall be protected against blockage and damage by wastes and residues before work begins. Suitable protection must be installed over drains while maintaining normal water flow at all times.

.7 Provide protection against the spread of dust, debris and water at or beyond the work area by suitable enclosures of sheeting and tarpaulins.

.8 Prevent the entry of dust, debris and water into the building by sealing all openings.

.9 All workmen must be protected from the effects of dust during cutting-out operations. The contractor shall ensure that all workmen wear adequate, approved protective equipment during these operations and as required at other times.

1.9 EXISTING CONDITIONS

.1 The contractor shall report to the Minister in writing all areas of severely deteriorated masonry revealed during the work, and shall await instruction regarding repair or replacement of masonry units.

1.10 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with the Minister's instructiions.

Part 2 Products

2.1 WATER

.1 Water shall be potable and free from contamination.

2.2 CEMENT

.1 Cement shall be white Portland cement.

.2 Low-alkali cement is preferred. Gray Portland cement, though less expensive, is not suitable for use on historic masonry because of the high content of soluble salts that cause staining, efflorescence and crystallization stresses in weak masonry, salts such as sodium and calcium sulphates and hydroxides, and sodium silicates. Gray Portland cement that includes hydrated lime and cement in a pre-mixed state may be suitable, provided that the ratio of mix constituents conform generally to those established in table 3.6.1. Its use is suggested where excessive moisture in masonry is a problem.

2.3 LIME

.1 Hydrated lime to ASTM C207-79 (1984).

.2 Lime putty slaked from fresh quicklime produces a superior, stronger mortar with greater plasticity and workability than putty run from hydrated lime (CSA A82).

2.4 PIGMENT

.1 Pigments shall be dry, powdered, inorganic pigments, such as manufactured by Northern Pigment Ltd., Toronto, Ontario acceptable alternate.

.2 Pigments have traditionally been made by heating various natural earth and metal oxide compounds to achieve various colours. Ochre, sienna and umber are examples of natural earth pigments. Yellow, brown and red tones are produced by heating iron oxides. Most pigments tend to fade under UV exposure.

2.5 AGGREGATE

.1 The aggregate shall be a well-graded washed sand matching the texture and range of sizes found in the mortar to be matched. The colour of the sand shall be an exact match of the original; a blending of sands may be required where appropriate. The colour of the mortar should ideally be achieved through the sand only.

.2 The sand should contain a full range of sizes from fine to quite coarse. Asphalt sand is a readily available grade that gives such a range. Brick sand is generally too homogeneous in grade size. The addition of pigments for special effects is normally restricted to tuck pointing, sand being the general colouring agent.

2.6 BONDING AGENT

.1 Bonding agents should be used with caution: synthetic admixtures can cause the formation of soluble salts, and increased shrinkage through the added water. Utilize pure acrylics such as Acryl 60 (Thorosystems Ltd.) or equivalent. Polyvinyl acetate (PVA) type, which breakdown under ultraviolet exposure, is not acceptable.

2.7 POWER EQUIPMENT

.1 Where allowed, a power reciprocating masonry saw may be used to remove the existing mortar joint. Acceptable equipment includes: Arbortech AS170.

Part 3 Execution

3.1 PREPARATION OF HYDRATED LIME

.1 Putty can be made from hydrated mason's lime by adding dry bagged hydrated lime to water. The mass is stirred and hoed to form a thick cream. Allow to stand at least 24 hours before use - preferably longer.

.2 Hydrated limes are produced from quicklime by the addition of a limited amount of water. The resulting dry powder is bagged. Dolomitic Finishing Hydrated Limes (Type S) develop superior plasticity than Mason's (Type N) Hydrated Limes. It is very important that quicklimes be fully slaked, as any unslaked particles will subsequently expand and disturb the rest of the work. It is for this reason that all putty be allowed to temper for at least two weeks before use.

3.2 PREPARATION OF ROUGHAGE

.1 If the contractor desires, the lime and aggregate may be pre-mixed to produce what is known as roughage or coarse-stuff. This compound may be stored indefinitely if kept sealed from air and kept from freezing.

.2 Lime hardens slowly through the absorption of carbon dioxide (carbonation), in contrast to hydraulic cements that set quickly through a reaction with water.

.3 The sand and lime should be accurately proportioned using measuring boxes constructed to contain the exact volume of each ingredient required to make one batch. These materials are to be thoroughly mixed in a mechanical mixer for about ten minutes, then stored in plastic-lined drums and sealed until required.

.4 When required for use the correct portion of gauging cement should be added, and the mix worked up as specified and used immediately.

.5 As the strength and colour of even slightly different mixes varies dramatically, accurate portioning is a strict requirement of this specification.

3.3 CEMENT GAUGING OF MORTARS

.1 The addition of hydraulic cements to lime and aggregate mixes must be done immediately before the use of the mortar.

.2 All mortar must be used within two hours of gauging; do not re-temper mortars after this time has elapsed.

.3 All batching is to be done with wooden boxes or plastic pails of known volume to ensure standardization and conformity of measurement. Shovel measurement of materials is not permitted. Boxes should be of such a size that a batch sufficient for one mixer load is measured out.

.4 Initially, mortars should be mixed for five minutes without cement or the addition of water. Careful addition of a small amount of water should produce a mortar that is just wet enough to hang on a trowel. Excess water creates a shrinkage problem, and water content in excess of 5% will retard carbonation significantly.

.5 Cement should be added and mixed for about two minutes before use.

.6 The amount of water required should be recorded and added at the start of mixing for future batches.

.7 Mortars must be mixed a total of at least 10 minutes before using to improve wearability, increase air entrainment and plasticity, and ensure thorough mixing.

.8 All mixing boards and mechanical mixing machines must be cleaned between batches.

.9 Strict control must be exercised so that masons refrain from using too wet a mix. The addition of water does improve workability but does so at the sacrifice of mechanical strength and the increase in final shrinkage. Mortars must be just damp enough to hang on a trowel. Only water lost through evaporation should be replaced at the mortar-board by the mason; a spray bottle of water is used for this purpose.

3.4 MIX FORMULAE

.1 (The appropriate mix formula to be selected by the Minister.)

Mortar Designation	Cement: Lime Aggregate	Masonry Material	SELECTED EXPOSURE Sheltered	Moderate	Severe
ii	1:1/2:4-4 1/2	Highly durable: granite, hard brick, etc.	iv	iii	ii
iii	1:1:5-6				
iv	1:2:8-9	Moderately durable: stones, bricks, etc.	v	iv	iii
v	1:2:10-12				
vi	0:2:5	Poor durable: soft brick, friable stone, etc.	vi	v	iv

.2 The mix recommendations are conservative; old, valuable masonry should be re-pointed with a mix one grade weaker than that shown.

.3 For repointing of smooth, hard materials such as polished granite the mix water should be replaced with a 1:1 bonding agent: water solution, to improve edge adhesion.

.4 Addition of a bonding agent is not recommended for softer masonry as the strength of the mix is increased substantially and an excessive concentration of salts may be formed in the mortar.

.5 These formulae are based upon the use of lime putty and white Portland cement. The use of lime-based mortars requires considerable skill on behalf of the mason to produce first-class work.

.6 Lime-based mortars are extremely slow-setting, progressively developing strength over several months. The initial set of the lime takes about three days under good conditions.

.7 The small amount of white Portland cement provides a fast initial set to the mix; it requires however, a moist cure for about two days to achieve a reasonable strength. After this time the masonry should be kept quite dry, to assist in the carbonation of the lime.

.8 Carbonation requires the entry of carbon dioxide gas in air to enter the mass through the porous structure of the mortar and masonry. Heavy buildups of mortar should be avoided if possible; where deep, thick joints are necessary the backup mortar should be mixed with an aggregate of broken, porous brick chips or other suitable material to aid in the aeration of the mass. They should be added to the mix just before placement. The

presence of large amounts of water in the masonry hinders carbonation by filling the pores and preventing access of carbon dioxide to the interior.

3.5 COLOURING OF MORTARS

.1 If it is necessary to match existing coloured mortar, samples of freshly-broken mortar from the original masonry pointing must be obtained.

.2 All matching must be done with unweathered samples of mortar to determine the exact colour used. Final shading to match adjacent weathered mortar can be obtained by using less colourant in many instances. Soiled mortar should not be used as a match, because if the soiled mortar is cleaned at a later date, any new repairs will show up as dirty. The overall colour of mortars should come from the aggregate, not the binder. As mortars weather, the aggregate is gradually exposed and etched, and becomes the principal element affecting the overall colour.

.3 A test patty of mortar must be prepared, accurately proportioned to represent the final mix formula and amount of pigment.

.4 The final colour of the patty must be determined only when it is dry. Accelerated drying of the sample can be accomplished by drying the patty in an oven or over a hot-plate.

.5 No more than 10% by volume of pigment shall be added to mortars.

.6 Once proportions are determined, careful control during mixing is vital to ensure quality control. A measuring box should be made to hold the specified amount of pigment for each mortar batch.

.7 Suitable pigments to obtain certain colours are suggested below. The exact amount of each pigment to match existing samples must be determined by experiments.

Yellow-Beige	Sienna
Brown-Beige	Brown Umber
Red-Terra-Cotta	Burnt Sienna - Brown Umber
Limestone	Bone Black - Brown Umber
Gray Sandstone	Green Umber

3.6 METHOD OF CUTTING-OUT

.1 All cutting-out is to be done by skilled mechanics under the direction of a competent mason experienced in this type of work.

.2 A great deal of damage can be done to masonry in a short period of time by inexperienced workmen. Often this damage is irreparable, resulting in the loss of historic material. The use of students and untrained laborers for this operation is not acceptable.

.3 All cutting-out of joints is to be done with hammer and chisel, unless otherwise specified herein.

.4 Cutting out of head joints is to be by hand only. Power chisels, power saws and angle grinders are not acceptable. Head joints rarely cut out properly with power saws, and

often the adjacent units are badly chopped or cut. All pricing of work should be based upon hand cutting fort head joints.

.5 Cutting out of horizontal joints may be completed with reciprocating saws and angle grinding wheels under the following conditions:

.1 All work is to be done under the direct supervision of the foreman.

.2 Angle grinders may be used only to score one cut in each joint at the centre of the joint; the cut is to be no more than one half the width of the joint, and cut to the full depth of the joint required.

.3 The face edges of the stone are to be cleaned up on the bench after the stone is removed from the wall.

.6 It is practically impossible to remove hard Portland cement-based mortars from masonry by hand-chiseling, but with care a satisfactory result can be achieved with mechanical cutting equipment as an aid. Great care must be taken so as not to damage masonry units adjacent to joints.

3.7 REPOINTING

.1 Immediately before repointing operations commence, the area to be pointed is to be thoroughly flushed with water to remove all dust and to wet the surface well until suction is controlled and the surface stays wet.

.2 Pointing is to be build up in layers not exceeding 12 mm in depth; the bottom layers must be allowed to set before subsequent layers of mortar are applied.

.3 After the final layer of mortar has set the joint is to be tooled lightly to give the final required form. Do not overwork the face of the joint. Head joints must be tooled first.

.4 All masons are to use identical jointing tools.

.5 Joints are to be tooled behind the face of the masonry units to match the weathered joints.

.6 It is strongly recommended that joints be matched with a slightly recessed joint, tooled flat or slightly concave. This allows the front edge of the masonry units to stand clear of the jointing mortar, and not be covered with excess mortar. The matching of adjacent mortar is easier using this method of finishing the joints, and it offers the additional benefit of relieving the stress on the outer edges of the masonry units. Stipple the joint with a stiff brush to give a textured, weathered appearance; this compacts the joint and removes laitance (the superficial accumulation of fine particles).

.7 All excess mortar must be removed from the face of the masonry before it sets, and the jointing neatly finished as specified.

.8 Several types of tooled finishes are possible:

.1 Struck-flush - this is formed as the work proceeds by pressing with the trowel the wet mortar that protrudes beyond the face, flat and flush with the wall. The edges are then neatly trimmed.

.2 Flat-jointed - as above, but with the addition of a semi-circular groove run along the centre of the joint with a finishing tool and straight-edge. Sometimes called grapevine jointing.

.3 Keyed/Concave - struck flush, then finished with a curved tool slightly wider than the joint, forming a dense concave joint.

.4 Recessed - formed by raking back the mortar about 10 mm to give an even shadow line.

.5 V-joint - struck flush, then finished with a v-shaped tool run along the face edges of the units.

.6 Raised - formed to protrude beyond the face of the unit, occasionally bevelled top and bottom to form an inverted "V".

.7 Tuck-pointed - consists of filling a previously raked-out joint flush with mortar and evening out any irregularities in the masonry. The entire face of the wall is rubbed with a soft flat brick after being coloured with brick dust to hide the wet joints. White lime putty is pressed against the joint in straight lines with a jointer template run on a straight-edge. Before the edges are removed the putty edge is trimmed with a 'Frenchman', a knife-like tool with a bent edge. A raised white joint about 6 mm wide and 2 mm thick is left on the face of the work. Variations on this theme are numerous.

.8 Bastard tuck-pointing - a ridge about 6 mm wide and 2 mm deep is formed directly on the flush joint. In historical practice this was often painted later in black or white when set.

3.8 CLEAN UP

.1 Excess mortar shall be immediately removed from adjacent surfaces.

.2 As work proceeds clean all masonry with a fibre-bristle brush or plastic brush. Do not use a metal brush at any time.

.3 Wash down the completed sections of wall from top to bottom as the pointing has hardened. Allow three days for the initial hardening of the mortar.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 The General Conditions, the Supplementary Conditions, the Instructions to Bidders and Division One General Requirements shall be read in conjunction with and govern this section.

.2 The Specification shall be read as a whole by all parties concerned. Each Section may contain more or less than the complete work of any trade. The Contractor is solely responsible to make clear to the Subcontractors the extent of their work.

1.2 DESCRIPTION

.1 Supply labour, materials, plant, tools and equipment to complete the Work as shown on the Drawings and as specified herein including, but not limited to the following:
- .1 Concrete Deck
- .2 Primer & 2 ply Hot Applied Rubberized Asphalt Waterproofing Membrane,
- .3 Protection Course,
- .4 Drain Board & Back-Fill.

1.3 RELATED WORK

.1 Section 01 45 00 Quality Control
.2 Section 04 03 06 Cleaning Historic Masonry
.3 Section 04 03 07 Repointing Historic Masonry

1.4 REFERENCES

.1 CAN/CGSB-37.9M: Primer, Asphalt, Unfilled for Asphalt Roofing, Dampproofing and Waterproofing.
.2 CGSB-37-GP-50M89: Hot Applied Rubberized Asphalt for Roofing and Waterproofing.
.3 CGSB-37-GP-51M: Application of Hot Applied Rubberized Asphalt for Roofing and Waterproofing.
.4 CGSB-37-GP-56M: Membrane, Bituminous, Prefabricated and Reinforced for Roofing.
.5 CCMC # 06808L.

1.5 SUBMITTALS

.1 Prior to commencing the Work, submit copies of manufacturers current certification to ISO 9000. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.

.2 Prior to commencing the Work, submit references clearly indicating that the materials proposed have been installed for not less than fifteen years on projects of similar scope and nature. Submit references for a minimum of ten projects.

.3 Prior to commencing the Work submit manufacturers complete set of standard details for waterproofing systems.

1.6 QUALITY ASSURANCE

.1 Perform Work in accordance with the printed requirements of the membrane manufacturer and this specification. Advise designer of any discrepancies prior to commencement of the Work.

.2 Maintain one copy of manufacturers literature on site throughout the execution of the Work

.

.3 At the beginning of the Work and at all times during the execution of the Work, allow access to site by the waterproofing membrane manufacturers representative

.

.4 Submit documentation certifying that the primary membrane complies with CGSB 37-GP-50M.

.5 Materials used in this Section, including, primers, mastics and membranes, asphaltic protection boards, composite drainage boards and expansion joint membranes shall be fully compatible and shall be sourced and or produced by one manufacturer.

.6 Submit copies of the membrane manufacturers current ISO certification including the manufacturing of the membrane, primer, mastics, adhesives and asphaltic protection board.

.7 The rubberized asphalt membrane product shall contain an inert clay filler to enable the product to be resistant to acids (fertilizers, building washes and acid rain).

1.7 SHOP DRAWINGS

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

1.8 DELIVERY, STORAGE AND HANDLING

.1 Delivery of Materials: Materials shall be delivered to the jobsite in undamaged and clearly marked containers indicating the name of manufacturer and product.

.2 Storage of Materials

.1 Hot rubberized asphalt should be stored in closed containers outdoors.

.2 Store primer at temperatures of 5 degrees C (40 degrees F) and above to facilitate handling. Keep solvent away from open flames or excessive heat.

.3 Store materials in a dry location, in original containers, protected from water and direct sunlight, store roll materials on end.

.4 When products are stored outside, it must be elevated on a platform and be protected with a waterproof cover, which will shed water away from the material.

.5 Store all products in an upright position. Do not double stack unless product is on pallets and packaged as received from factory. Never stack more than two pallets high without racking.

.6 In cold weather store modified PLUS membranes in heated area and take onto roof immediately prior to use.

.7 Do not store modified PLUS membranes at ambient temperatures above 49 degrees C (120 degrees F).

.3 Handling of Materials:

.1 Primer contains solvent and is flammable. Do not use near open flame.

.2 Melting equipment shall consist of an indirect fired kettle with a double shell containing a high flash point heat transfer oil or hot air type. Kettle shall include a mechanical agitator.

.3 Avoid overheating of hot rubberized asphalt. Recommend application temperature of the membrane is 180 degrees C to 200 degrees C (356 degrees F to 395 degrees F). Do not heat above 215 degrees C (419 degrees F).

1.9 CO-ORDINATION

.1 Ensure continuity of the waterproofing membrane throughout the scope of this section.

.2 Work shall be so scheduled as to provide a watertight seal at the end of each working day on the areas worked upon during the day.

1.10 SITE CONDITIONS

.1 Environmental Requirements: No installation work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.

.2 Protection: Temporary protection of the membrane shall be provided to prevent mechanical damage or damage from spillage of oil or solvents until such time as permanent protection is provided.

1.11 MEMBRANE MANUFACTURER QUALIFICATION

.1 Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:

.1 Membrane Manufacturer must show evidence that the specified rubberized asphalt has been manufactured by the same source for fifteen (15) years and successfully installed on a yearly basis for a minimum of fifteen (15) years on projects of similar scope and complexity.

.2 Membrane Manufacturer must not issue warranties for terms longer than they have been manufacturing their hot fluid rubberized asphalt membrane.

1.12 ALTERNATES

.1 Alternate submission format to include:

.1 Submit evidence that alternate materials meet or exceed performance characteristics of Product requirements and documentation from an approved independent testing laboratory certifying that the performance of the waterproofing membrane system including drain boards and transition sheets, exceed the requirements of the National Building Code.

.2 Submit copies of manufacturers' current ISO certification.

.3 Submit references clearly indicating that the membrane manufacturer has successfully completed projects on a annual basis of similar scope and nature for a minimum of fifteen years.

.4 Submit manufacturers' complete set of standard details for the roofing membrane systems showing a continuous plane of water tightness throughout the building envelope.

.2 Submit requests for alternates to this specification a minimum of fifteen (10) working days prior to tender closing for evaluation. Include a list of 25 projects executed over the past fifteen years.

.3 Acceptable alternates will be confirmed by addendum. Substitute materials not approved in writing prior to tender closing shall not be permitted for use on this project.

1.13 WARRANTY

.1 For the Work of this section, the warranty period shall be 5 years.

.2 Roofing membrane manufacturer hereby warrants the membrane and membrane flashings for leak coverage as a result of faulty material for a period of five years. Scope of warranty shall include material and labour required to return the membrane to a watertight condition.

Part 2 Products

2.1 COMPONENTS AND MATERIALS

.1 Components and materials must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

2.2 WATERPROOFING MEMBRANE MANUFACTURER

.1 Acceptable manufacturers include;
Bakor Inc.,
15 Wallsend Drive
Scarborough, ON M1E 3X6
Tel: 1-800-387-9598
Fax: 1-866-483-9266
Web Site: www.bakor.com

2.3 HOT APPLIED RUBBERIZED ASPHALT WATERPROOFING MEMBRANE SYSTEM

.1 Primary membrane shall be 790-11 manufactured by Bakor, a hot applied rubberized asphalt membrane meeting the requirements of CAN/CGSB-37-GP-50M and shall be manufactured in a facility registered to ISO 9000.

.2 Primers

.1 Primer for hot applied rubberized asphalt membrane and flashings shall be 930-18 manufactured by Bakor, a polymer modified primer fully compatible with the primary membrane.

.2 Fabric reinforcement shall be Polyester Fabric as supplied by Bakor, a polyester reinforcement sheet capable of allowing the membrane to bleed through adequately to provide a monolithic reinforced membrane system.

.3 Flashing and reinforcement membrane shall be modifiedPLUS NP180p/p manufactured by Bakor, an SBS modified bitumen membrane having a minimum thickness of 3.0 mm (120 mils) and a non-woven polyester reinforcement of 180 g/m2 meeting CGSB 37-GP-56M Type 2 Class C Grade 2. The upper and lower surface shall have a polyethylene film.

.4 Crack treatment reinforcement membrane shall be modifiedPLUS NP180s/s manufactured by Bakor Inc., an SBS modified bitumen membrane having a minimum thickness of 2.2 mm (90 mils) and a non-woven polyester reinforcement of 180 g/m2 meeting CGSB 37-GP-56M Type 2 Class C Grade 2. The upper and lower surface shall be sanded and be fully compatible with the primary membrane.

.5 Protection course membrane shall be modifiedPLUS G100s/s as manufactured by Bakor, an SBS modified bitumen membrane having a minimum thickness of 2.0mm (80 mils) and a fibre glass reinforcement of 100g/m2 meeting CGSB-37-GP-56M Type 2 Class C Grade 1. The upper and lower surface shall be sanded and be fully compatible with the primary membrane.

.6 Termination Sealant shall be POLYBITUME 570-05 Polymer Modified Sealing Compound manufactured by Bakor, a polymer modified sealing compound, compatible with sheet waterproofing membrane, substrate and insulation materials, complies with CGSB 37.29, remains flexible with ageing and chemically resistant to alkalis, calcium chloride, mild acid and salt solution.

2.4 PREFABRICATED DRAINAGE BOARD (VERTICAL & HORIZONTAL)

.1 Material shall be Bakor DB 6200 Prefabricated Composite Drain Board, a polypropylene core board with polypropylene fabric attached, having the following physical properties:

.1 Flow Rate (V): 223 L/min/m,

.2 Flow Rate (H): 40 L/min/m,

.3 Compressive Strength: 15,100 psf,

.4 Thickness: 10 mm

Part 3 Execution

3.1 SUBSTRATE PREPARATION FOR CONCRETE, CAST IN PLACE CONCRETE & COMPOSITE DECK

.1 Minimum 2,500 psi (17,235 kPa) compressive strength, minimum 115 pcf (1842 kg/m3) density.

.2 Wood-float or wood-trowel equivalent finish. Steel trowel finish is not desirable.
.1 Water cure, wet coverings, paper sheets, plastic sheets or approved liquid curing compound (sodium silicate preferred). Contact BAKOR for other alternatives.
.2 Duration of Cure/Dry: Recommended 28 days, minimum 14 days prior to application of the membrane for structural weight concrete.
.3 Duration of Cure/Dry: Recommended 60 days, minimum 28 days prior to application of membrane for lightweight structural concrete. Venting of the deck from the underside is recommended to facilitate drying.

.3 The above minimum cure/dry times are recommended based upon basic concrete fundamentals and experience. Depending on conditions (i.e., ambient temperature, humidity) the concrete may be dry enough to receive application of the membrane in less than the 14 day minimum recommendation.

.4 All concrete surfaces shall be cured a minimum of 14 days and shall be dry. All concrete placed in vented metal pan decks shall be cured a minimum of 60 days.

.5 Concrete surfaces shall be wood float finish and uniform. Steel float finishes are too smooth and require sandblasting or equivalent prior to system application.

.6 Before application of hot applied rubberized asphalt, the substrate shall be clean and dry, free from surface water, ice, snow or frost, dust, dirt, oil, grease, curing compounds of any other foreign matter detrimental to the adhesion of the hot applied rubberized asphalt.

.7 Any scaling or latent concrete shall be sandblasted off.

.8 Voids, cracks, holes, honeycombs and other damaged horizontal or vertical surfaces shall be repaired before application of the membrane.

.9 The contractor shall review all surfaces to receive the membrane and report any discrepancies prior to installing the waterproofing system.

3.2 PRIMER APPLICATION

.1 Apply primer uniformly at the rate recommended by the manufacturer avoiding an excessive or over-spraying application. Ponding of the primer is not recommended.

.2 The primer shall be dry before applying the hot applied rubberized asphalt.

.3 Plywood does not require a primer.

3.3 DECK TO VERTICAL JUNCTURES (SET IN HOT APPLIED RUBBERIZED

ASPHALT)

.1 Apply hot rubberized asphalt membrane to provide a thickness of approximately 3 mm (1/8") to the vertical faces and a minimum of 200 mm (8") out onto the horizontal surface.

.2 Embed flashing membrane in the hot applied rubberized asphalt membrane, avoiding any wrinkles or fish mouths, extending a minimum of 75 mm (3") out onto the horizontal surface and 75 mm (3") up vertical. Lap ends of flashing membrane a minimum of 75 mm (3").

.3 At monolithic pour, use a strip of 150 mm (6") wide Polyester Fabric.

3.4 CRACKS (MEMBRANE SET IN HOT APPLIED RUBBERIZED ASPHALT)

.1 Seal cracks and joints between 3.0 mm (1/8") and 12mm (1/2") in width with a 3 mm (1/8") thick coat of hot applied rubberized asphalt membrane and a strip of 150mm (6") wide flashing membrane, centered on joint. Extending membrane 75 mm (3") beyond the sheet edges. Cracks between 1.5mm (1/16") and 3.0 mm (1/8") may be treated with a 150 mm (6") wide strip of polyester fabric set in 3.0 mm (1/8") membrane.

3.5 EXPANSION JOINT (FLASHING MEMBRANE SET IN HOT APPLIED RUBBERIZED ASPHALT)

.1 At expansion joints use adhesive grade reinforcement membrane, loop expansion joint membrane down into joint, embedded into a 3 mm (1/8") thick layer of hot applied rubberized asphalt membrane.

.2 Ensure that the depth of loop is minimum 35 mm (1 1/2"). Extend flashing membrane minimum of 150 mm (6") on each side of joint. Seal end joints a minimum of 150 mm (6") and seal with a 3 mm (1/8") coat of membrane. Fill loop with membrane.

.3 In vertical applications secure top of expansion joint sheet with continuous fixing bar at vertical wall locations.

3.6 MEMBRANE FLASHING AT DRAINS (MEMBRANE SET IN HOT APPLIED RUBBERIZED ASPHALT)

.1 The area around the drains shall be coated with hot applied rubberized asphalt membrane at a thickness of 3 mm (1/8").

.2 Flashing sheet shall be placed over the coat drain flange extending a 150 mm (6") beyond the flange.

.3 A second coat of hot applied rubberized asphalt membrane shall be applied over the flashing sheet at a thickness of 3 mm (1/8").

.4 Apply clamping ring exerting sufficient pressure o affect a seal between clamping ring and membrane. Temporarily block all drains during the application of ballast, or other materials, which might block the drains. Remove blocking when work is not in progress and upon completion.

3.7 APPLICATION OF PRIMARY WATERPROOFING HOT APPLIED RUBBERIZED ASPHALT MEMBRANE

.1 Ensure deck is ready to receive hot applied rubberized asphalt membrane. Where torch applied flashing membranes have been used, ensure top polyfilm has been scorched away prior to application of the membrane.

.2 Apply membrane smooth, free from air pockets, wrinkles, or tears and to manufacturer's Instructions. Ensure full bond of membrane to substrate.

.3 Apply first layer of hot rubberized asphalt membrane evenly to a minimum thickness of 2 mm to form a continuous monolithic coating over horizontal and vertical surfaces including previously reinforced areas.

.4 Apply fabric reinforcing sheet and firmly press into first layer of hot membrane. Overlap fabric approximately 6 mm (1/4") ensuring that a layer of membrane is present between overlaps. Apply second layer of membrane over the fabric to a minimum thickness of 3mm (1/8") providing a total thickness of 5 mm (215 mils).

3.8 INSTALLATION OF PROTECTION COURSE

.1 Protection course shall be rolled onto hot applied rubberized asphalt membrane while still warm and tacky.

.2 Lap protection course 50 mm on side laps and 150 mm on end laps.

.3 Starting at the low points or drains lay the protection course membrane in full continuous sheets in a shingle pattern. Stager all end laps.

3.9 INSTALLATION OF DRAINAGE BOARD (HORIZONTAL)

.1 Loose lay boards starting at a low point of roof, the edge of the core flange shall be at the higher edges of the substrate, away from drains.

.2 Overlap in the direction of water flow. Pull back loose fabric to expose drain core and position core of second panel over the overlap flange of first panel.

.3 Bend drain board to create inside corners and cut board to create outside corners, provide 3 inch of extra fabric to wrap corner.

.4 Stagger or offset joints of drain board sheets. Place all subsequent sheets in an overlapping single fashion.

3.10 CLEAN-UP

.1 Promptly as the work proceeds and on completion clean up and remove from site all rubbish and surplus materials resulting from the foregoing work.

END OF SECTION