Specifications
Issued for Tender

Parks Canada Agency

Underground Bunker Upgrades
Port Royal National Historic Site

Project No. 4088.17
GEMTEC Limited

Jeremy Kinney, P.Eng.
CIVIL
GEMTEC Limited
191 Doak Road, Fredericton, NB

Tracey McDade, P.Eng., LC, LEED AP
ELECTRICAL
RSEI Consultants Ltd.
564 Prospect Street, Fredericton, NB

END

DRAWING LIST

END

PART 1 GENERAL

1.1 Work Covered By Contract Documents

.1 The Work in this Contract comprises the excavation of the material around the underground fire suppression bunker, the construction of a new perimeter drainage system and lift station, repairs to the waterproofing membrane, the installation of a new electrical feed and underground cable ducts, and the replacement of backfill soils at the Port Royal National Historic Site, Nova Scotia.

1.2 Contract Method

.1 Construct Work under a unit price contract.

1.3 Work by Others

.1 Co-ordinate work with that of other Contractors.

.2 Additional payments or schedule extensions due to work or scheduling conflicts with other Contractors will not be considered.

1.4 Work Sequence

.1 Construct Work in stages to accommodate continuous public access to the Port Royal National Historic Site.

1.5 Contractor Use of Premises

.1 Limit use of premises for Work, to allow:
- .1 Work by other contractors.
- .2 Public usage.
- .3 Parks Canada will accommodate the Contractor with a location for their construction trailer.

.2 Storage areas for Contractor's equipment and materials shall be located outside the Park boundaries. Locations for equipment and materials storage areas shall be the responsibility of the Contractor.

.3 Disposal of waste materials shall be outside the Site Boundaries except as directed in these specifications. Locations and costs associated with waste disposal shall be the responsibility of the Contractor.

.4 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

1.6 Summary of Work

.1 The tasks associated with the underground bunker upgrades at the Port Royal National Historic Site are summarized as follows. Details of the requirements are provided in the project technical specifications and drawings.

.1 Excavate and dispose of unsuitable fill materials to limits shown in drawings.

.2 Construct perimeter drainage system including pipe, clear stone, and geotextile as shown in drawings.

.3 Following excavation of existing soil materials adjacent to bunker, existing waterproofing membrane will be inspected by Departmental Representative. Departmental Representative will determine where membrane repair/replacement is required. Contractor will repair or replace waterproofing membrane on exterior bunker walls, as required.

.4 Construct lift station and piping associated with lift station.

.5 During construction relocate utilities located within limits of excavation. Following construction, restore utilities to pre-construction state.

.6 Construct electrical trench and install electrical cables and conduit, connectors, boxes, fastenings, other associated items.

.7 Construct new flashing details around pipes and other extrusions.

.8 Backfill excavated area with approved material.

.9 Topsoil and sod disturbed areas as required.

1.7 Existing Services

.1 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.2 Protect, relocate or maintain existing active services.

1.8 Documents Required

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

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to the Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.
.12 Construction Schedule
.13 Environmental Control Plan (ECP)

END

PART 1 GENERAL

1.1 Access and Egress

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, in accordance with relevant municipal, provincial and other regulations.

1.2 Use of Site and Facilities

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

.2 Provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

1.3 Alterations, Additions or Repairs

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

1.4 Existing Services

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

1.5 Special Requirements

.1 Work outside of normal working hours will require 48 hours written notice to the Departmental Representative.

.2 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.

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

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

PART 2 PRODUCTS

2.1
NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1
NOT USED

.1 Not Used.

END OF SECTION

END

PART 1 GENERAL

1.1 Measurement

.1 All measurement shall be unit price unless otherwise indicated.

.2 All bid items shall include equipment, labour and incidentals necessary to complete the work to the satisfaction of the Departmental Representative.

1.2 Pay Items

.1 All items in this contract will be paid for by costs included in the unit prices and one Lump Sum Payment for costs not included in these items.

.2 Bid Item 1 – Section 01 29 00
- .1 Terms of Payment: Lump Sum
- .2 This Item includes:
  - .1 Mobilization and Demobilization for the project.

.3 Bid Item 2 – Sections 01 52 00, 01 56 00
- .1 Terms of Payment: Lump Sum
- .2 This Item includes:
  - .1 Construction and removal of all temporary construction facilities, signage, and barriers.

.4 Bid Item 3 – Section 01 35 43
- .1 Terms of Payment: Lump Sum
- .2 This Item includes:
  - .1 All environmental controls required at the site including any required pumping.
  - .2 Payment for this item includes:
    - .1 Dewatering of site.
  - .3 This item also includes the following:
    - .1 Temporary Water Control Works, in accordance with the NSTIR Standard Specification Item 621 – Temporary Water Control Works.

.1 Materials and labour required to control the water.

.5 Bid Item 4 – Section 32 32 13.13
.1 Terms of Payment: Lump Sum
.2 This Item includes:
.1 1500mm Douplex Lift Station
.1 1500mm Structure
.2 Two (2) Pumps
.3 Control Panel
.4 Access Panel
.5 Rail access system
.6 Any additional equipment to complete installation
.7 All labour required for completion of the lift station

.6 Bid Item 5 – Section 01 51 00
.1 Terms of Payment: Lump Sum
.2 This Item includes:
.1 Temporary Relocation of Services
.1 Installation of 200x200x150 gate valve
.2 Removal of existing 200mm pipe
.3 Reinstallation of 200mm pipe once work on the north side of the bunker is finished.
.4 Standby pump to supply water to the sprinkler system at pressures and volume equivalent to existing system.

.7 Bid Item 6 – Division 26 and Section 33 65 76
.1 Terms of Payment: Lump Sum
.2 This Item includes:
.1 Electrical Services
.1 Construction of new electrical services within the bunker. RW90 copper wiring o control panel.
.2 Trenching for, and installation of, underground electrical ducts and wiring. All wiring to be compliant with relevant codes.

.8 Bid Item 7 - Section 31 23 33 – Excavating, Trenching, and Backfilling

.1 Unit of Measurement: Cubic Metre

.2 Method of Measurement: Calculated from cross sections taken by the Departmental Representative in areas of excavation. Departmental Representative will take initial cross sections after topsoil stripping is completed and immediately prior to excavation of material to be incorporated into work. Final cross sections will be taken when material is excavated to the final lines and grades.

.3 This item includes: excavation, stockpiling, and disposal of excavated material as indicated on the drawings. Stockpiling of common material and topsoil included in this item. This item also includes roadway dust control. Surplus material not incorporated into the roadway cross section shall become the property of the Contractor and disposed of offsite.

.9 Bid Items 8, 9 and 10 - Section 33 42 13– Underground Drainage Systems

.1 Unit of Measurement: metre (m) for each size and type of pipe.

.2 Method of Measurement: along centreline of new pipe, from end to end of pipe, as laid and as accepted by the Departmental Representative.

.10 Bid Items 11 and 12 - Section 31 23 33 and 31 37 00 – Clear Stone, Backfill soils and R25 Rip Rap:

.1 Units of Measurement:

.1 Backfill: cubic metres (m^3)

.2 20 mm clear stone and R25 Rip Rap: tonnes

.2 Method of Measurement: Calculated from cross sections taken by the Departmental Representative in areas of excavation. Departmental Representative will take initial cross sections after topsoil stripping. Final cross sections will be taken when material is excavated to the final lines and grades.

3 There shall be no payment for excavation beyond the limits indicated on the drawings

.11 Bid Item 13 - Section 31 32 19 - Geotextiles:
.1 Unit of Measurement: Square metre in place.
.2 This item includes: supply and installation of geotextile and shall include all equipment, labour and incidentals necessary to complete the work to the satisfaction of the Departmental Representative.

.12 Bid Item 14- Section 07 13 52 – Polymetric Drainage Board:
.1 Unit of Measurement: Square metre in place.
.2 This item includes: supply and installation of polymetric drainage board and shall include all equipment, labour and incidentals necessary to complete the work to the satisfaction of the Departmental Representative.

.13 Bid Item 15 - Section 07 13 52 – Modified Bituminous Sheet Waterproofing Barrier:
.1 Unit of Measurement: Square metre in place.
.2 This item includes: supply and installation of waterproofing barrier and shall include all equipment, labour and incidentals necessary to complete the work to the satisfaction of the Departmental Representative.

.14 Bid Item 16 - Section 07 21 13 – Polystyrene Rigid Insulation:
.1 Unit of Measurement: Square metres of surface area (horizontal measurement).
.2 Method of Measurement: The surface area of 50mm sheets used. When sheets are installed on top of another the area of each 50mm layer will be accounted for.
.3 This item includes: The installation of extruded polystyrene SM Type IV insulation, 50mm thick.
.4 There shall be no payment for wasted material.

.15 Bid Item 17 - Section 32 91 21 - Topsoil Placement and Grading:
.1 Unit of Measurement: Square metres of surface area (horizontal measurement).

.2 Method of Measurement: The surface area shall be measured jointly with the Departmental Representative using a measuring wheel or approved alternative method.
.3 This item includes: Placement and grading topsoil stockpiled along the back slope and or toe of slope on finished slopes to a thickness of 150 mm.
.4 There shall be no payment for areas topsoiled outside the construction limits unless approved by the Departmental Representative.

.16 Bid Item 18 - Section 32 92 23 – Sodding:
.1 Unit of Measurement: Square metres of surface area (horizontal measurement).
.2 Method of Measurement: The surface area shall be measured jointly with the Departmental Representative using a measuring wheel or approved alternative method.
.3 This item includes: The acquisition and installation of sod materials.
.4 There shall be no payment for sod installed in areas outside the construction limits unless approved by the Departmental Representative.

.17 Bid Item 19 – Section 07 13 52 – Sealing penetrations - Modified Bituminous Sheet Waterproofing:
.1 Unit of Measurement: Each penetration sealed.
.2 This item includes: supply and installation of sealants and shall include all equipment, labour and incidentals necessary to complete the work to the satisfaction of the Departmental Representative.

PART 2

Products 2.1

NOT USED

PART 3

Execution 3.1

NOT USED

END

PART 1 GENERAL

1.1 Administrative

.1 The Contractor shall Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.

.2 The Contractor shall prepare agenda for meetings.

.3 The Contractor shall Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 The Contractor shall provide physical space and make arrangements for meetings.

.5 The Contractor shall preside at meetings.

.6 The Contractor shall record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 The Contractor shall Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants, affected parties not in attendance and the Departmental Representative.

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

1.2 Preconstruction Meeting

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

.2 Senior representatives of Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 The Contractor shall establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.
.2 Schedule of Work: in accordance with NSTIR Standard Specification.
.3 Schedule of submission of shop drawings, samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
.6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.7 Owner provided products.
.8 Record drawings in accordance with Section 01 78 00 – Closeout Submittals.
.9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
.11 Monthly progress claims, administrative procedures, photographs, hold backs.
.12 Appointment of inspection and testing agencies or firms.
.13 Insurances, transcript of policies.

1.3 Progress Meetings

.1 During course of Work schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.

.3 Notify parties minimum 7 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 4 days after meeting.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 GENERAL

1.1 Definitions

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

1.2 Requirements

.1 Prepare and submit to the Departmental Representative within 5 days of notification of Contract award, one copy of the construction schedule in the form of a bar chart showing the dates for commencement and completion of each major activity of the work, including the work of subcontractors; dates for

submissions, review and return of shop drawings, etc.; the dates of Substantial and Final Completion; and intended man hours of labour and equipment for each major item of work. If the schedule as submitted is unacceptable in any way, submit without delay a revised schedule satisfactory to the Departmental Representative.

.2 The Departmental Representative is to notify the Contractor in writing of acceptance of the Construction Schedule. Comply with the Construction Schedule at all times. If, for any reason, the Construction Schedule is not followed, immediately notify the Departmental Representative of the change and submit a revised schedule for acceptance. Upon written acceptance by the Departmental Representative, this schedule will become the Construction Schedule.

.3 Whenever required, give further written particulars concerning this schedule. The submission to and acceptance by the Departmental Representative of the Contractor's Construction Schedule or the furnishing of details and particulars thereto will not relieve the Contractor of any duties and responsibilities under the Contract.

.4 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.5 Plan to complete Work in accordance with prescribed milestones and time frame.

.6 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.7 Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 Action and Informational Submittals

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 Execution

3.1 NOT USED

_____ END _____

PART 1 GENERAL

1.1 Administrative

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

.2 This section specifies general requirements and procedures for Contractor's submissions of shop drawings, product data, samples and mock-ups to the Departmental Representative for review. Additional specific requirements for submissions are specified in individual sections.

.3 Do not proceed with Work until relevant submissions are reviewed by the Departmental Representative.

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

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

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

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

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

.9 Make any changes which Departmental Representative may require consistent with Contract Documents and resubmit as directed by the Departmental Representative.

.10 Notify the Departmental Representative, in writing, when resubmitting, of any revisions other than those requested by the Departmental Representative.

1.2 Submission Requirements

.1 Coordinate each submission with requirements of work and Contract Documents.
Individual submissions will not be reviewed until all related information is available.

.2 Allow 7 days for Departmental Representative's review of each submission.

.3 Adjustments made on submissions by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.4 Make changes in submissions as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.5 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.
- .6 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative

certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.7 After Departmental Representative's review, distribute copies.

1.3 Shop Drawings

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

.2 Where necessary or requested by the Departmental Representative, submit drawings stamped and signed by professional engineer registered or licensed in the Province of Nova Scotia.

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

.4 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.5 Cross-reference shop drawing information to applicable portions of Contract Documents.

1.4 Product Data

.1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.

.1 Submit electronic copies of product data.

.2 Sheet size: 215 x 280 mm, maximum of 3 modules.

.3 Delete information not applicable to project.

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

.5 Cross-reference product data information to applicable portions of Contract Documents.

1.5 Samples

.1 Samples: examples of materials, equipment, quality, finishes, workmanship.

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

1.6 Test Reports

.1 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

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

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

1.7 Certificates

.1 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

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

.2 Certificates to be dated after award of project contract complete with project name.

1.8 Manufacturer's Instructions

.1 Submit electronic copies of manufacturer instructions.

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

1.9 Review

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

.2 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

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

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

1.10 Certificates and Transcripts

.1 Immediately after award of Contract, submit Letter of Good Standing from Workers Compensation Board of Nova Scotia.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 GENERAL

1.1 References

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

.2 Province of Nova Scotia
.1 Occupational Health and Safety Act (most recent version).

1.2 Definitions

.1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

.2 Competent Person: means a person who is:
.1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and;
.2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
.3 Knowledgeable about potential or actual danger to health or safety associated with the Work.

.3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.4 PPE: personal protective equipment

.5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 Submittals

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

.2 Submit site-specific Health and Safety Plan prior to commencement of Work.

.1 Submit within 10 work days of notification of Bid Acceptance. Provide 3 copies.

.2 Departmental Representative will review Health and Safety Plan and provide comments.

.3 Revise the Plan as appropriate and resubmit within 5 work days after receipt of comments.

.4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.

.5 Submit revisions and updates made to the Plan during the course of Work.

.3 Submit name of designated Health & Safety Site Representative and support documentation specified in the Safety Plan.

.4 Submit copies of permits obtained.

.5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization.

.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

.6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 Compliance Requirements

.1 Comply with Occupational Health and Safety Act for Province of Nova Scotia, and Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations (COSH) as well as any other regulations made pursuant to the Act.

.1 The Canada Labour Code can be viewed at: www.http://laws.justice.gc.ca/en/L-2/

.2 COSH can be viewed at: www.http://laws.justice.gc.ca/eng/SOR-86-304/ne.html

.3 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.

.4 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.

.5 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 Responsibility

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

.2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to Work Site with safety requirements of Contract Documents, applicable federal, provincial, and local by-laws, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.6 Site Control and Access

.1 Control the Work and entry points to Work Site. Approve and grant access only to workers and

authorized persons. Immediately stop and remove non-authorized persons.

.1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site. However, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.

.2 Isolate Work Site from other areas of the premises by use of appropriate means.

.1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment.

.2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.

.3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.

.4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.

.5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. Provide security guard where adequate protection cannot be achieved by other means.

1.7 Protection

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

.2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take measures to rectify situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

1.8 Filing of Notice

.1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.

.1 Departmental Representative will assist in locating address if needed.

1.9 Permits

.1 Post permits, licenses and compliance certificates, at Work Site.

.2 Where a particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

1.10 Hazard Assessments

.1 Perform site specific health and safety hazard assessment of the Work and its site.

.2 Carryout initial assessment prior to commencement of Work with further assessments as needed during progress of work, including when new trades and subcontractors arrive on site.

.3 Record results and address in Health and Safety Plan.

.4 Keep documentation on site for entire duration of the Work.

1.11 Project / Site Conditions

.1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:

.1 Known latent site and environmental conditions:

.1 Working near watercourse.

.2 Working on steep or uneven ground.

.3 Electrical safety required.

.4 Working with adverse weather conditions.

.5 Working near trench excavations.

.6 Working near buried utilities.

.9 Working near heavy moving machinery.

.2 Facility on-going operations:

.1 The Contractor will co-operate with users of existing facilities. Maintain access to the existing park facilities and consult with the Departmental Representative for site access limitations.

.3 Should interference occur, take directions from Departmental Representative.

.4 Do not unreasonably encumber site with materials.

.5 Move stored products or equipment which interfere with operations.

.6 Comply with all regulations and authorities having jurisdiction over the work.

.2 Above items shall not be construed as being complete and inclusive of potential health and safety hazards encountered during Work.

.3 Include above items in the hazard assessment of the Work.

.4 MSDS Data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.

1.12 Meetings

.1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative,

prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:

.1 Superintendent of Work

.2 Designated Health & Safety Site Representative

.3 Subcontractors

.2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.

.3 Keep documents on site.

1.13 Health and Safety Plan

.1 Prior to commencement of Work, develop written Health and Safety Plan specific to the Work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site.

.2 Health and Safety Plan shall include the following components:

.1 List of health risks and safety hazards identified by hazard assessment.

.2 Control measures used to mitigate risks and hazards identified.

.3 On-site Contingency and Emergency Response Plan as specified below.

.4 On-site Communication Plan as specified below.

.5 Name of Contractor's designated Health & Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.

.6 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.

.3 On-site Contingency and Emergency Response Plan shall include:

.1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.

.2 Evacuation Plan: site plan layouts showing marshalling areas. Details on alarm notification methods, location of firefighting equipment and other related data.

.3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.

.4 Emergency Contacts: name and telephone number of officials from:

.1 General Contractor and subcontractors.

.2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.

.3 Local emergency resource organizations.

.5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of Parks Canada and Facility Management contacts.

.4 On-site Communication Plan:

.1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.

.2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.

.5 Address all activities of the Work including those of subcontractors.

.6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.

.7 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Plan with correction of deficiencies or concerns.

.8 Post copy of the Plan, and updates, prominently on Work Site.

1.14 Safety Supervision

.1 Employ Health & Safety Site Representative responsible for daily supervision of health and safety of the Work.

.2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:

.1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work

.2 Monitor and enforce Contractor's site-specific Health and Safety Plan.

.3 Conduct site safety orientation session to persons granted access to Work Site.

.4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.

.5 Stop the Work as deemed necessary for reasons of health and safety.

.3 Health & Safety Site Representative will:

.1 Be qualified and competent person in occupational health and safety.

.2 Have site-related working experience specific to activities of the Work.

.3 Be on Work Site at all times during execution of the Work.

.4 All supervisory personnel assigned to the Work shall also be competent persons.

.5 Inspections:

.1 Conduct regularly scheduled safety inspections of the Work on a minimum biweekly basis. Record deficiencies and remedial action taken.

.2 Conduct Formal Inspections on a minimum monthly basis. Use standardized safety inspection forms. Distribute to subcontractors.

.3 Follow-up and ensure corrective measures are taken.

.6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.

.7 Keep inspection reports and supervision related documentation on site.

1.15 Training

.1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.

.2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.

.3 When unforeseen or peculiar safety-related 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.

1.16 Minimum Site Safety Rules

.1 Notwithstanding requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:

.1 Wear appropriate PPE pertinent to the Work or assigned task; minimum being hard hat, safety footwear, safety glasses and hearing protection.

.2 Immediately report unsafe condition at site, near-miss accident, injury and damage.

.3 Maintain site and storage areas in a tidy condition free of hazards causing injury.

.4 Obey warning signs and safety tags.

.2 Brief persons of disciplinary protocols to be taken for noncompliance. Post rules on site.

1.17 Correction of 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 noncompliance of health and safety issues identified.

.3 Departmental Representative will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 Incident Reporting

.1 Investigate and report the following incidents to Departmental Representative:

.1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.

.2 Medical aid injuries.

.3 Property damage in excess of $10,000.00,

.4 Interruptions to Facility operations resulting in an operational loss to a Federal Department in excess of $5000.00.

.2 Submit report in writing.

1.19 Hazardous Products

.1 Comply with requirements of Workplace hazardous Materials Information System (WHMIS).

.2 Keep MSDS data sheets for all products delivered to site.

.1 Post on site.

.2 Submit copy to Departmental Representative.

.3 For interior work in an occupied Facility, post additional copy in one or more publicly accessible locations.

1.20 Blasting

.1 Blasting or other use of explosives is not permitted on site without prior receipt of written permission and instructions from Departmental Representative.

1.21 Confined Spaces

.1 Abide by occupational health and safety regulations regarding work in confined spaces.

.2 Obtain an Entry Permit in accordance with Part XI of the Canada Occupational Health and Safety Regulations for entry into an existing identified confined space located at the Facility or premises of Work.
.1 Obtain permit from Facility Manager
.2 Keep copy of permit issued.

.3 Safety for Inspectors:
.1 Provide PPE and training to Departmental Representative and other persons who require entry into confined space to perform inspections.
.2 Be responsible for efficacy of equipment and safety of persons during their entry and occupancy in the confined space.

1.22 Site Records

.1 Maintain on Work Site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.

.2 Upon request, make available to Departmental Representative or authorized Safety Officer for inspection.

1.23 Posting of Documents

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in

accordance with Acts and Regulations of Province having jurisdiction.

.2 Post other documents as specified herein, including:
.1 Site specific Health and Safety Plan
.2 WHMIS data sheets

.3 Fire and Safety Requirements
.4 Special Procedures on Lockout Requirements

END

PART 1 GENERAL

1.1 Standard

.1 All work of this section shall comply with the requirement of the most recent version of the Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Standard Specification Division 7, except as amended herein.

1.2 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):

- .1 NSTIR Standard Specification Division 7- Environmental Protection.
- .2 The Nova Scotia Environment Act and Regulations pursuant to the Act.
- .3 The Erosion and Sedimentation Control Handbook for Construction Sites.
- .4 TIR Environmental Management Program Manual.
- .5 CWRS Erosion and Sediment Control Course and binder.

.2 Canadian Environmental Assessment Act (most recent version).

1.3 Fires

.1 Fires and burning of rubbish on site is not permitted.

1.4 Disposal of Wastes

.1 Dispose of waste material in designated waste disposal area.

.2 Remove and dispose of containers and waste fluids associated with vehicle maintenance in a provincially approved waste disposal site outside the park.

.3 Disposal of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers is prohibited. Dispose of

all waste materials at Provincially approved waste disposal site outside the park boundary. Littering is prohibited.

.4 To the maximum extent possible, divert waste cardboard, plastic and metal products from landfill to appropriate recycling facilities.

1.5 Drainage

.1 Provide temporary drainage and pumping required to keep excavations and site free from water.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

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

1.6 Site Clearing and Plant Protection

.1 Exercise special care to protect trees, shrubs and vegetation within contract limit lines outlined on drawings or as directed by Departmental Representative.

.2 Protect roots of designated trees to drip line during excavation and site grading to prevent disturbance or damage.

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

.3 Minimize stripping of topsoil and vegetation, especially in the vicinity of stream banks

.4 Restrict tree removal to areas indicated or designated by Departmental Representative.

.5 When, in the opinion of the Departmental Representative/Park Environmental Protection Officer (EPO), negligence on the part of the Contractor results in unnecessary damage or destruction of vegetation, or other environmental or aesthetic features within or beyond the staked or designated work area, the Contractor shall be responsible, at its

expense, for the complete restoration including the replacement of trees, shrubs, grass, etc. to the satisfaction of the Departmental Representative.

1.7 Erosion and Sediment Control

.1 All measures necessary to minimize erosion and the mitigation of sediment shall be provided as required or as directed by the Departmental Representative.

.2 Labour, equipment and materials to be provided and will be considered as incidental to the work, except for payment items specifically identified in the unit price table.

1.8 Work Adjacent To Waterways

.1 The Contractor is required to install, inspect and maintain in good working order temporary erosion, siltation and pollution control features, as directed by Departmental Representative. These devices are to be removed in proper manner upon completion of project.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris.

.4 Do not skid logs or construction materials across waterways.

.5 Do not operate construction equipment in waterways.

.6 Works performed in and around waterways will be carried out in accordance with regulations of authorities having jurisdiction.

.7 Cuts and fills adjacent to waterways are to be stabilized, and ditch run-outs constructed to prevent entry of silt into waterways. In vicinity of stream banks, maintain as much of the existing vegetation as possible.

.8 On conclusion of construction, debris will be disposed of to prevent its entry into waterways and stream beds returned to its original configuration.

1.9 Pollution Control

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

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

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

.4 All equipment, vehicles and plant used on site will be in good operating condition and leak free. The Departmental Representative reserves the right to have the Contractor immediately remove from the site, any deficient equipment, vehicles, etc.

1.10 Vehicular Movements

.1 Restrict movement of vehicles and equipment to existing disturbed areas (access roads, borrow pits, disposal areas and right-of-ways).

1.11 Storage and Handling of Fuels And Dangerous Fluids

.1 Locate fuel storage facility outside Park and minimum of 100 m from any water body. Any fuel storage tankage (s) used shall be of adequate double-walled safety construction and shall be enclosed by an impermeable containment dyking system with a volume capacity equal to at least 110% of fuel storage tank(s)' fuel storage capacity. Any spillage and/or ponded fuel shall be immediately recovered and placed in secure containers. When no longer required, the fuel storage area shall be cleaned up to satisfaction of the Departmental Representative and any fuel

contaminated soil removed to the nearest approved industrial waste disposal site.

.1 Fueling of vehicles or equipment will not be permitted within 100 m of any water body.

.2 Exercise care in handling of fuels to minimize potential for fuel spills. Report immediately any fuel spills to Departmental Representative. Contractor is responsible for any cleanup or repair resulting from any spills.

.3 Supply and maintain on site emergency response material to contain spills and minimize environmental damage, i.e. absorbent material, to the approval of Departmental Representative. Disposal of all contaminated material as per Clause 1.4 of this section.

1.12 Erosion Control

.1 Sediment fences and ditch erosion control structures shall be constructed in roadside ditches or at culvert inverts prior to any excavation as directed by Departmental Representative.

.2 To minimize run-off, work on slopes which may affect water bodies will be curtailed during periods of heavy rainfall, as directed by the Departmental Representative.

.3 Provide and maintain a project and site specific Erosion and Sediment Control (ESC) Plan.

1.13 Environmental Protection Plan

.1 The Contractor is required to submit a plan showing all pollution control measures and sediment control measures that will be used to fulfill the requirements of the Environmental Protection Section and Environmental Screening attached to this document. This plan will be reviewed by the Departmental Representative and the Environmental Protection Officer prior to start of construction activities

END

PART 1 - GENERAL

1.1 Optional Site Meeting

.1 Prior to tender submission an optional site meeting will be held; project scope and construction details and restrictions will be reviewed.

.2 Tenderers shall be advised that a date and time for the optional site visit will be announced with the tender.

1.2 National Parks Act

.1 The requirements and regulations made under the National Parks Act shall apply to this project.

.2 A copy of this Act may be obtained by contacting the Departmental Representative.

1.3 Heritage "Period"

.1 Contractors wishing to tender on this project shall be aware that the work proposed under this Contract involves construction within a site constructed to a "period" design.

1.4 Archeological Status

.1 Port Royal is designated as a National Historic Site.

.2 In areas where cultural resources are observed, the Staff Archeologist will direct that the Contractor load and transport the excavated material to the designated soil storage area for later screening. The Contractor shall follow all instructions received from the Archeology Department in this regard. The Contract price shall include allowances to load and transport excavated material to the soil storage areas.

.3 The Staff Archeologist and Park Warden's service assigned to this project shall have authority to suspend work on this project

in the event that directions and specifications are not followed or when there is a threat to resources.

1.5 Pre-Construction Mitigation

.1 The Contractor will be firmly aware that he/she are working in a National Historic Site setting with its emphasis on cultural and natural resource protection.

.2 The Environmental Screening containing two sets of mitigations, one set for cultural resource protection and one set for natural resource protection, will be read in its entirety and mitigation will be followed as described.

.3 The National Parks Act and Historic Parks Regulations will be followed during all phases of construction. The Acts and Regulations can be made available for review at the Administration Office of Port Royal.

.4 A field meeting with Project Archeologist, Contractor, Project Liaison Officer, and Project Manager will be scheduled prior to construction.

.5 Contractor's Project Manager will ensure that all on-site subcontractors and suppliers are fully informed of all information in the Environmental Screening and that this information is issued to all staff.

.6 All defined areas with fencing and barricades are not to be removed unless otherwise stated by Project Archeologist and Park Warden.

.7 The Departmental Representative is authorized to order a work stoppage in the event of immediate impact to cultural resources.

.8 The Contractor will adhere to all mitigation set out in the Environmental Screening.

.9 All equipment operators will be trained and familiar with cultural resources.

.10 When surveillance archeology is required the archeologist will oversee all excavation and shall stop the work to record or remove the archeological resources encountered, or to check the presence of these resources.

.11 Archeology will be contacted immediately if archeological resources are encountered.

.12 To mitigate damage to cultural resources encountered during construction the Contractor will undertake additional measures at the direction of the Surveillance Archeologist. They may include geotextile, protective covering and any materials associated with stabilization.

.13 Any artifacts or items of historical significance uncovered or found during construction or maintenance, and their associated archeological records, shall revert back to Canada.

1.6 Construction Mitigation

.1 Archeological surveillance is required along construction corridor only where outlined in the Environmental Screening.

.2 Confine all work actively within the limits specified and outlined in construction plans.

.3 Access to work areas will be via routes approved in advance.

.4 When negligence on the part of the Contractor results in damage or destruction of cultural resources the Contractor shall

be responsible, at his/her expense, for complete restoration or rehabilitation to the satisfaction of the Departmental Representative.

.5 Excavations will not be permitted beyond the identified corridor approved by archeology.

.6 If any artifacts, cultural resources or structural features are located during construction activities, all work will stop in that area until the surveillance archeologist reviews the findings.

.7 Report immediately any spills to Archeology and Warden's Office. See resource conservation mitigating measures for reporting procedures and notifications.

.8 The Contractor is responsible for responding immediately to any spill to minimize environmental damage and for any clean-up or rehabilitation resulting from any spills to an approved level.

.9 All landscape disturbed by construction will be returned to its preconstruction standards, unless otherwise advised.

.10 All equipment and materials associated with the project will be removed after the job is completed. A final inspection will be done.

.11 Stock piling (i.e. gravel, pipe, geotextile, plywood and associated materials) is restricted to approved locations.

.12 Temporary water supply will not impact on the grounds surface and will be located in the identified area approved by archeology.

.13 Water bodies are not to be altered and water levels are not to be changed during construction.

.14 Filtration systems due to sub-excavation will be located in those areas identified on construction plans and will require archeological approval if changes are required.

1.7 Definitions

.1 Archeology: A set of theories, methods and techniques for the study of human behavior from material remains of past activities. Other sorts of evidence, such as documents, are used when available, but archeology deals with the recovery and analysis of physical evidence from on or below the surface of the ground and underwater. Archeological techniques are designed to recover the spatial and chronological relationships (i.e., artifacts that make up archeological sites. It is these relationships that form the essential basis for understanding archeological evidence.

1.8 Relics and Antiquities

.1 Comply with CEAA Environmental Screening (current screening).

.2 Any artifact or items of historical significance uncovered during construction or maintenance and their associated archeological records, shall revert to Canada.

END

PART 1 GENERAL

1.1 References and Codes

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Perform Work in accordance with the EA for this project

.3 Meet or exceed requirements of:
- .1 Contract documents.
- .2 Specified standards, codes and referenced documents.

1.2 National Parks Act

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 GENERAL

1.1 Inspection

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

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

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

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination 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.

1.2 Independent Inspection Agencies

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.

.2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised

by Departmental Representative at no cost to the owner. Pay costs for retesting and reinspection.

1.3 Access to Work

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.4 Procedures

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 Rejected Work

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

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

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

1.6 Reports

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

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

1.7 Tests and Mix Designs

.1 Furnish test results and mix designs as requested.

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 Action And Informational Submittals

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

1.2 INSTALLATION AND REMOVAL

.1 All underground utilities located within the limits of work shall be temporarily relocated for the duration of the work.

.2 Except with the express consent of the Departmental Representative, service shall not be interrupted.

1.3 WATER SUPPLY

.1 Throughout the duration of the work, a temporary water supply must be installed and maintained to supply the fire protection system. The system shall supply pressure and flow equivalent to the existing system.

1.4 FIRE PROTECTION

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

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 GENERAL

1.1 Access

.1 Provide and maintain adequate access to project site.

.2 As required, build and maintain temporary roads during period of work. Parks Canada will approve prior to their use, any proposed temporary roads within the Park.

.3 Upon completion of contract work, rehabilitate any temporary roads to the satisfaction of the Departmental Representative.

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

.5 Clean roads and parking areas where used by Contractor's equipment or employees' vehicles.

1.2 Site Signs

.1 Safety and Instruction Signs and Notices:

.1 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321-77.

.2 Maintenance and Disposal of Site Signs:

.1 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.

.2 No separate payment to be made for Project Identification Site Signs. Cost shall be deemed incidental to work.

1.3 Sanitary Facilities

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

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

1.4 Removal of Temporary Facilities

.1 Remove temporary facilities from site when directed by Departmental Representative.

1.5 Contractor's Camp

.1 The Contractor will not be permitted to set up a camp within the Port Royal National Historic Site.

.1 Applicable Provincial and/or Municipal regulatory permits for camp(s) outside the Park will be obtained and copies forwarded to Superintendent, the Port Royal National Historic Site.

1.6 Measurement for Payment

.1 Unless specifically stated otherwise, items under this section not to be measured for payment but are considered incidental to Contract.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 GENERAL

1.1 Installation and Removal

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

.2 Remove from site all such work after use.

1.2 Hoarding

.1 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.3 Guard Rails and Barricades

.1 Provide secure, rigid guard rails and barricades around deep excavations.

.2 Provide as required by governing authorities.

.3 The work area will require a minimum 1.8 m (6 ft.) high rigid perimeter fence.

1.4 Fire Routes

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

1.5 Protection for Off-Site and Public Property

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.6 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

_____ END _____

PART 1 GENERAL

1.1 References

.1 Within text of each specifications section, reference may be made to reference standards. Conform to these reference standards, in whole or in part as specifically requested in specifications.

.2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.3 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 Quality

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

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

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental

Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 Storage, Handling and Protection

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

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

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

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

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

1.4 Transportation

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

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

1.5 Manufacturer's Instructions

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

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

1.6 Quality of Work

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

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

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

1.7 Co-ordination

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

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

1.8 Remedial Work

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

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

1.9 Existing Utilities

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

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 GENERAL

.1 Departmental Representative's identification of existing survey control points and property limits as identified on the drawings.

1.1 Qualifications of Surveyor

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

1.2 Survey Reference Points

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Departmental Representative.

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

1.3 Survey Requirements

.1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.2 Establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading, fill and topsoil placement.

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

1.4 Existing Services

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

1.5 Location of Equipment and Fixtures

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

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

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

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

1.6 Records

.1 Maintain a complete, accurate log of control and survey work as it progresses.

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

1.7 Action and Informational Submittals

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

_____ END _____

PART 1 GENERAL

1.1 References

.1 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC) - ID: R0202D, Title: General Conditions "C", In Effect as Of: May 14, 2004.

1.2 Project Cleanliness

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

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Clear snow and ice from access to site or facilities of the work, bank/pile snow in designated areas only.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide suitable on-site containers for collection of waste materials and debris.

.6 Provide and use marked separate bins for recycling.

.7 Dispose of waste materials and debris outside the limits of the National Park at a location/facility approved by the Authority having jurisdiction.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.3 Final Cleaning

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.9 Remove dirt and other disfiguration from exterior surfaces.

1.4 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 NOT USED

END

PART 1 GENERAL

1.1 References

.1 Canadian Environmental Protection Act (CEPA)
  .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.2 Administrative Requirements

.1 Acceptance of Work Procedures:
  .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    .2 Request Departmental Representative inspection.
  .2 Departmental Representative Inspection:
    .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    .2 Contractor to correct Work as directed.
  .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
    .1 Work: completed and inspected for compliance with Contract Documents.
    .2 Defects: corrected and deficiencies completed.
    .3 Equipment and systems: tested, adjusted and balanced and fully operational.
    .4 Operation of systems: demonstrated to Departmental Representative's personnel.
    .5 Work: complete and ready for final inspection.
  .4 Final Inspection:
    .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
    .2 When Work incomplete according to Departmental Representative, complete outstanding items and request reinspection.

1.3 Final Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 GENERAL

1.1 Administrative Requirements

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

.2 Departmental Representative to establish communication procedures for:
  .1 Notifying construction warranty defects.
  .2 Determine priorities for type of defects.
  .3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 Action and Informational Submittals

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals.

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

1.3 Format

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.
.1 Identify contents of each binder on spine.

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

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.
.1 Bind in with text; fold larger drawings to size of text pages.

1.4 Contents - Project Record Documents

.1 Table of Contents for Each Volume: provide title of project;
.1 Date of submission; names.
.2 Addresses and telephone numbers of Consultant and Contractor with name of responsible parties.
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Testing and Quality Control.

1.5 As -Built Documents and Samples

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.
.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.
.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.6 Recording Information on Project Record Documents

.1 Record information on set of black line opaque drawings, provided by Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

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

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

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

1.7 Equipment and Systems

.1 For each item of equipment and each system include description of unit or system, and component parts.
.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
.1 Include regulation, control, stopping, shut-down, and emergency instructions
.2 Include summer, winter, and any special operating instructions.

.3 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.4 Provide servicing and lubrication schedule, and list of lubricants required.

.5 Include manufacturer's printed operation and maintenance instructions.

.6 Include sequence of operation by controls manufacturer.

.7 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.8 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.9 Include test and balancing reports as specified in Section 01 45 00 – Testing and Quality Control.

.10 Additional requirements: as specified in individual specification sections.

1.8 Materials and Finishes

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

_____ END _____

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 23 10 - Excavating, Trenching and Backfilling.

1.2 References

.1 Canadian Federal Legislation
- .1 Canadian Environmental Protection Act (CEPA), 1988.
- .2 Canadian Environmental Assessment Act (CEAA), 1995.
- .3 Transportation of Dangerous Goods Act (TDGA), 1992.
- .4 Motor Vehicle Safety Act (MVSA), 1995.

.2 United States Environmental Protect Agency
- .1 CFR 86.098-10, Emission Standards for 1998 and Later Model Year Otto-Cycle Heavy Duty Engines and Vehicles.
- .2 CFR 86.098-11, Emission Standards for 1998 and Later Model Year Diesel Heavy Duty Engines and Vehicles.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):

1.3 Definitions

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly. Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.
- .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
- .2 Indicates quantities of reuse, recycling and landfill.

.2 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related required submittal and reporting requirements.

.3 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.5 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.4 Administrative Requirements

.1 Site Meetings.
.1 Convene pre-demolition meeting one week prior to beginning work of this Section in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:
.1 Verify project requirements.

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
.3 Hold project meetings as required.
.4 Ensure key personnel, site supervisor, project manager, subcontractor representatives and WMC attend.
.5 Reporting Requirements: WMC to complete.
.6 WMC will provide written report on status of waste diversion activity at meetings.
.7 Departmental Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
.1 Notify Departmental Representative in writing when unforeseen delay[s] occur.

1.5 Action and Informational Submittals

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

.2 Hazardous Materials:
  .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.3 Waste Reduction Workplan:
  .1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan indicating:
    .1 Descriptions of and anticipated quantities of materials to be salvaged reused, recycled and landfilled.
    .2 Schedule of selective demolition.
    .3 Name and address of waste facilities.

.4 Certificates:
  .1 Submit copies of certified weigh bills and receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on weekly basis.
  .2 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.

.5 Sustainable Design Submittals:
  .1 Construction Waste Management:
    .1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
    .2 Submit calculations on end-of-project recycling, salvage, and landfill rates demonstrating construction wastes were recycled or salvaged.

1.6 Delivery, Storage and Handling

.1 Perform all work in accordance with Section 01 35 43 - Environmental Procedures.

.2 Storage and Protection.

.1 Protect in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.
.2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or repair to approval of Departmental Represent and at no cost to Owner.

.3 Remove and store materials to be salvaged, in manner to prevent damage.

1.7 Site Conditions

.1 Site Environmental Requirements.
.1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.

.2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
.1 Ensure proper disposal procedures are maintained throughout the project.

.4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.6 Protect trees, plants and foliage on site and adjacent properties where indicated.

1.8 Regulatory Requirements

.1 Ensure all work is performed in compliance with CEPA, CEAA, TDGA, MVSA, EA and all applicable provincial regulations.

1.9 Scheduling

.1 Ensure project timelines are met without compromising specified minimum rates of material diversion. Notify Departmental Representative in writing of delays.

PART 2 PRODUCTS

2.1 Equipment

.1 Equipment and heavy machinery used to meet or exceed all applicable emission requirements operate in compliance with EPA CFR 86.098-10 and EPA CFR 86.098-11and MVSA.

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

PART 3 EXECUTION

3.1 Preparation

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

3.2 Removal of Hazardous Wastes

.1 Remove contaminated or dangerous materials defined by authorities having jurisdiction including but not limited to creosote hardwood box culverts and asphalt impregnated asbestos-coated metal pipes, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.3 Removal Operations

.1 Remove items where indicated.

.2 Do not disturb items designated to remain in place.

3.4 Protection

.1 Repair damage to adjacent materials or property caused by selective site demolition

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 07 21 13 Board Insulation

1.2 References

.1 Specification American Society for Testing and Materials (ASTM):
- .1 ASTM D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension
- .2 ASTM D570, Standard Test Method for Water Absorption of Plastics
- .3 ASTM D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- .4 ASTM D903, Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
- .5 ASTM D1876, Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
- .6 ASTM D1970, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- .7 ASTM D2243, Standard Test Method for Freeze-Thaw Resistance of Water-Borne Coatings
- .8 ASTM D5385, Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- .9 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
- .10 ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials
- .11 ASTM E154, Standard Test Methods for Water Vapour Retarders Used in

Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

.2 Canadian Construction Materials Centre (CCMC):
.1 CCMC 13297-R

1.3 Action and Informational Submittals

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 – Testing and Quality Control.
.1 Existing Substrate Condition: report deviations in writing to Departmental Representative.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

.4 Qualifications: Provide proof of qualifications when requested by Departmental Representative:
.1 Submit in writing, a document stating that the applicator of the sheet applied waterproofing

membrane specified in this section is recognized by the manufacturer as suitable for the execution of the Work.

.2 Perform Work in accordance with the manufacturer's written instructions of the sheet applied waterproofing membrane and this specification.

.3 Maintain one copy of manufacturer's written instructions on site.

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

.5 Components used in this section shall be sourced from one manufacturer; including sheet applied waterproofing membrane, sealants, primers, mastics and adhesives.

1.4 Delivery, Storage and Handling

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

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

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.6 Ambient Conditions

.1 Apply when ambient air and substrate temperatures are above temperature range indicated by sheet applied waterproofing membrane manufacturer, during time of install, and for a minimum of forty-eight (48) hours after installation, unless otherwise indicated.

.2 Ensure surfaces are sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants.

.3 Do not permit traffic of any kind over unprotected waterproof membranes. Apply protection course as soon as possible in accordance with manufacturers written instructions.

1.7 Sequencing

.1 Sequence work in accordance with Section 01 32 16.07 - Construction Progress Schedules.

.2 Sequence work to permit installation of materials in conjunction with related materials and seals.

PART 2 - PRODUCTS

2.1 Sheet Materials

.1 Sheet Applied Waterproofing Membrane:

.1 Self-adhering waterproofing membrane (Henry Bakor Blueskin WP200 or approved equivalent) consisting of SBS modified bitumen and a cross-laminated polyethylene film, having the following properties:

.1 Thickness: 1.5mm (60 mils)

.2 Water Vapour Transmission (ASTM E96): 1.14 ng/Pa.m2.s., (0.02 perms)

.3 Peel Strength (ASTM D903): 1576N/m

.4 Minimum Puncture Resistance – Membrane (ASTM E154): 222 N/m

.5 Hydrostatic Head (ASTM D1876): 70m of Water

.6 Moisture Absorption (ASTM D570): 0.1% Maximum
.7 Tensile Strength (ASTM D412-modified): 2.24 MPa
.8 Elongation (ASTM D412-modified): 300%

2.2 Adhesives and Primers

.1 Adhesive for self-adhering membranes at temperatures above -12°C shall be Blueskin® Adhesive manufactured by Henry-Bakor (or approved equivalent), a synthetic rubber based adhesive, quick setting, having the following physical properties:
.1 Colour: Blue,
.2 Weight: 0.8 kg/L,
.3 Solids by weight: 35%,
.4 Drying time (initial set): 30 minutes

.2 Warm weather application adhesive for self-adhering waterproofing membranes at temperatures above –4 degrees C shall be Aquatac® Primer manufactured by Henry-Bakor (or approved equivalent), a polymer emulsion based adhesive, quick setting, having the following physical properties:
.1 Colour: Aqua,
.2 Weight: 1.0 kg/l,
.3 Solids by weight: 58%,
.4 Water based, no solvent odours,
.5 Drying time (initial set): 30 minutes at 50%RH and 20 degrees C.

.3 Cold weather application adhesive for self-adhering waterproofing membranes at temperatures above -12°C shall be Blueskin® Hi-Tac Adhesive (or approved equivalent) a rubber-based adhesive, quick setting, having the following properties:
.1 Colour: Yellow
.2 Weight:: 0.8 kg/l
.3 Solids By Weight: 35%
.4 Drying Time (initial set): Approximately 30 minutes.

2.3 Mastics and Termination Sealants

.1 Insulation and Protection Board Adhesive: Synthetic rubber base compound (230-21 Insulation Adhesive by Henry Company, or approved equivalent) having the following characteristics:
- .1 Colour: Cream.
- .2 Compatible with sheet applied waterproofing membrane, substrate and insulation materials.
- .3 Long term flexibility: Pass CGSB 71-GP-24M.
- .4 Chemical resistance: Alkalis, mild acid and salt solutions.
- .5 Application Temperature: between -12 deg C and 40 deg C.

.2 Termination and Joint Sealant: Polymer modified sealing compound (POLYBITUME 570-05 Polymer Modified Sealing Compound by Henry Company, or approved equivalent) having the following characteristics:
- .1 Colour: Black.
- .2 Compatible with sheet applied waterproofing membrane and substrate.
- .3 Solids by volume: 70%.
- .4 Vapour permeance: 2.9 ng/Pa.m^2.s, ASTM E96.
- .5 Complies with CGSB 37.29.
- .6 Remains flexible with ageing.
- .7 Adheres to wet surfaces.
- .8 Chemical resistance: Alkalis, calcium chloride, mild acid and salt solutions.

.3 Protection Board
- .1 Extruded flexible twin wall board made of polypropylene copolymer (990-31 Polypropylene Protection Board by Henry Company, or approved equivalent) having the following physical properties:
  - .1 Thickness 2mm (80 mils)
  - .2 Tensile Strength Yield Point: 32 kg/cm^2

.3 Tensile Strength Point of Failure: 242 kg/cm²
.4 Elongation: 167%
.5 Compression Strength (ASTM D695): 0.54 kg/cm²
.6 Impact Strength at 0 degrees C (32 degrees F): 8.9 kg/cm

.4 Drainage Boards
.1 Two-part prefabricated geo-composite drain board consisting of a formed polystyrene core covered on one side with a woven or non-woven polypropylene filter fabric.
.1 Vertical Applications: (Bakor DB 6000 by Henry Company, or approved equivalent) Designed for vertical installations requiring a high compressive strength and moderate flow capacity.
.2 Horizontal Applications: (Bakor DB 9000 by Henry Company, or approved equivalent) Designed for demanding horizontal applications in plaza deck, split slab, horizontal flatwork and pavement construction.

.5 Auxiliary Materials
.1 Securement Bars: Continuous aluminum, stainless steel or galvanized metal, 3mm x 25mm x 25mm (1/8" x 1" x 1") in size and shall be pre-drilled for non-corrosive screw attachment on a maximum of 200mm (8") centers.
.2 Fire Barrier Sealant: 3M Fire Barrier Sealant FD 150+, or approved equivalent. Single-part, water-based, acrylic latex sealant. No-sag, low-shrinkage, low VOC. Used to firestop for pipe penetrations.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Examination

.1 Carefully expose and clean existing membrane for inspection by Departmental Representative.

.2 Verify that surfaces and conditions are ready to accept work of this section.

.3 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with membrane manufacturer's requirements.

.4 Report unsatisfactory conditions to Departmental Representative in writing.

.5 Do not start work until deficiencies have been corrected.

.6 Beginning of Work implies acceptance of conditions.

3.3 Preparation

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.4 Installation

.1 Install materials in accordance with manufacturer's instructions.

.2 Non-Moving Substrate Crack Treatment and Corner Treatment:

.1 Gaps up to 3mm (1/8") wide:

.1 Sealant Method: Apply 1.5mm (60 mil) coating of termination and crack sealant, 50mm (2") wide, centered on the gap and strike smooth. Allow to dry prior to application of membrane.

.2 Sheet Applied Method: Apply adhesive and allow to dry. Apply 150mm (6") wide strip of sheet applied waterproofing membrane, centered over gap and roll in place. Provide 75mm (3") end laps.

.2 Horizontal to Vertical Inside Corners: Pre-treated with termination and crack sealant, fillet extending 19mm (3/4") vertically and horizontally from the corner. Apply a minimum 225mm (8-3/4") strip of sheet applied waterproofing membrane centred at the joint and roll in place.

.3 Outside Corners: Apply adhesive and allow to dry. Apply a minimum 225mm (8-3/4") strip of sheet applied waterproofing membrane centred at the joint and roll in place.

.4 Projections: Extend sheet applied waterproofing membrane tight to projection and seal with termination and crack sealant extending 65mm (2-1/2") along projection and 65mm (2-1/2") onto waterproofing membrane.

.5 Drains: Install sheet applied waterproofing membrane collar centred on drain and extend 150mm (6") beyond flange onto substrate. Install waterproofing membrane in full width centred over drain and apply clamping ring in 1.5mm (60 mil) bed of termination and crack sealant.

.3 Adhesive or Primer for Sheet Applied Waterproofing Membrane:

.1 Apply adhesive or primer for sheet applied waterproofing membrane at rate recommended by manufacturer.

.2 Apply adhesive or primer to all areas to receive sheet applied waterproofing membrane. Apply by roller or spray and allow minimum thirty (30) minute open time. Surfaces not covered by sheet applied waterproofing membrane during the same working day must be re-applied.

.4 Sheet Applied Waterproofing Membrane - Vertical Application:

.1 Align and position sheet applied waterproofing membrane, to prepared and primed substrate in lengths of 2400mm (8') or less.

.2 Provide 65mm (2-1/2") laps at both sides and ends. Position for alignment and remove protective film.

.3 Press firmly into place and promptly roll all laps to seal.

.4 Overlap additional sheets in shingle fashion, staggering all vertical joints, in accordance with manufacturer's recommendations.

.5 Terminate sheet applied waterproofing membrane using termination sealant or termination bar, reglet or counter. Refer to manufacturers standard details.

.6 Seal all laps within 305mm (12") of a 90 degrees change in plane with termination sealant. Trowel apply a

feathered edge to all horizontal termination sealant applications to allow shedding of water.

.7 Sealant to be applied around all penetrations as per manufacturer's instructions.

.5 Sheet Applied Waterproofing Membrane - Horizontal Application:

.1 Apply 2 plies of sheet applied waterproofing membrane to prepared substrate in lengths of 2400mm (8') or less.

.2 Provide 65mm (2-1/2") laps at both sides and ends. Position for alignment and remove protective film.

.3 Press firmly into place. Promptly roll all laps to affect seal.

.4 Overlap additional sheets in shingle fashion, staggering all vertical joints, in accordance with manufacturer's recommendations.

.5 Terminate sheet applied waterproofing membrane using termination sealant or bar, reglet or counter flashing. Refer to manufacturers standard details.

.6 Seal all laps within 305mm (12") of a 90 degrees change in plane with termination sealant.

.7 Sealant to be applied around all penetrations as per manufacturer's instructions.

.6 Protection Board Installation:

.1 Install protection board over the sheet applied waterproofing membrane to prevent damage from backfilling.

.2 Apply protection board adhesive in 13mm (1/2") wide strips spaced at 457mm (18") o/c to sheet applied waterproofing membrane.

.3 Immediately embed protection board and press into adhesive to ensure full contact.

.4 Backfill once protection board adhesive has fully cured.

.7 Drainage Board Installation:

.1 Attach drainage board to surface using adhesive. Permanent fixing is achieved once backfilling operation is complete.

.2 Vertical Application: Place drainboard with fabric side outwards.

.1 Start at the top or bottom of the wall. Drain board may be applied horizontally or vertically.

.2 When installed horizontally, position edge of core with flange at the top. When installed vertically, align edge with flange at the upstream edge.

.3 Bottom panel should be placed behind the discharge pipe.

.3 Horizontal Application: Place drainboard with fabric side up.

.1 Start installation at lowest point to ensure positive drainage. Position edge of core with flange at the higher edge of the substrate, away from drains.

.4 Overlaps: Pull back loose fabric to expose core. Position core of second panel over the overlap flange of first level.

.1 Overlap in direction of water flow and adhere the overlapped fabric with adhesive to prevent soils and/or concrete from entering core.

.5 Corners: Bend drainage board for inside corners. Cut drainage board to reach corner, providing 100mm (4") of extra fabric to wrap around corner. Overlap fabric at joint.

.8 Fire Barrier Sealant:

.1 Sealant shall be installed around all electrical conduit penetrations as shown in drawings.

3.5 Field Quality Control

.1 Final Observation and Verification:
  .1 Final inspection of sheet applied waterproofing membrane shall be carried out by Departmental Representative and the contractor.
  .2 Contact Manufacturer for warranty issuance requirements.

.2 Sheet applied waterproofing membrane is not designed for permanent UV exposure. Apply protection board as soon as possible after installation of sheet applied waterproofing membrane. Refer to manufacturer published literature for product limitations.

3.6 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.7 Protection of Work

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

_____END_____

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 31 23 33 - Excavating, Trenching and Backfilling.

1.2 References

.1 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.

1.3 Action And Informational Submittals

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.

.2 Manufacturer's Instructions:
  .1 Submit manufacturer's installation instructions.

1.4 Quality Assurance

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

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

.3 Convene pre-installation meeting one week prior to beginning work of this Section in

accordance with Section 01 32 16.07 - Construction Progress Schedule.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordinate with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

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

1.5 Waste Management And Disposal

.1 Separate waste materials for reuse and recycling.

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

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

PART 2 - PRODUCTS

2.1 Insulation

.1 Below-grade insulation to be extruded polystyrene (XPS): to CAN/ULC-S701.
.1 SM Type IV.
.2 Thickness: 50 mm.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Workmanship

.1 Install insulation after building substrate materials are dry.

.2 Place insulation in locations noted on drawings. Place insulation on a prepared surface of compacted sand bedding with tight ship lap joints.

.3 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.4 Keep insulation minimum 75 mm from heat emitting devices.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset joints where possible. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.6 Offset both vertical and horizontal joints in multiple layer applications.

.7 Do not enclose insulation until it has been inspected and approved by Departmental Representative. Following Departmental Representative's approval, cover insulation with bedding sand prior to backfilling with other material.

3.3 Examination

.1 Examine substrates and immediately inform Departmental Representative of defects.

.2 Prior to commencement of work ensure:
.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.4 Cleaning

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

END

PART 1 - GENERAL

1.1 References

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.

1.2 Design Requirements

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.3 Action and Informational Submittals

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

.2 Submit for review single line electrical diagrams under plexiglass and locate as indicated.
- .1 Electrical distribution system in main electrical room.

.3 Shop drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.
- .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
- .3 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment

devices.

.4 Submit three (3) 600 x 600 mm minimum size drawings to authority having jurisdiction.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

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

.1 Provide CSA certified equipment and material.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Permits and fees: in accordance with General Conditions of contract.

.4 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.4 Quality Assurance

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

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings:

.1 In accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Charts.

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

1.5 Delivery, Storage and Handling

.1 Material Delivery Schedule: provide Departmental Representative with schedule within 2 weeks after award of Contract.

.2 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

1.6 System Startup

.1 Instruct Departmental Representative in operation, care and maintenance of systems, system equipment and components.

1.7 Operating Instructions

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

- .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- .3 Safety precautions.
- .4 Procedures to be followed in event of equipment failure.
- .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

PART 2 - PRODUCTS

2.1 Materials and Equipment

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

2.2 Warning Signs

.1 Warning Signs: in accordance with requirements of Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

2.3 Wiring Terminations

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

2.4 Equipment Identification

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, matt white finish face, black core, lettering accurately aligned and engraved

into core mechanically attached with self tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES

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

.2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.

.3 Wording on nameplates to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO.__" as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.5 Wiring Identification

.1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

2.6 Conduit and Cable Identification

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.7 Finishes

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

PART 3 - EXECUTION

3.1 Installation

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 Nameplates and Labels

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

3.3 Conduit and Cable Installation

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 Mounting Heights

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 Co-ordination of Protective Devices

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

3.6 Field Quality Control

.1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.2 Carry out tests in presence of Departmental Representative.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 Cleaning

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END

PART 1 - GENERAL

1.1 References

.1 CSA International
- .1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes and Fittings.
- .2 CAN/CSA-C22.2 No.65, Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.2 Action and Informational Submittals

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 Delivery, Storage and Handling

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and recycling.

PART 2 - PRODUCTS

2.1 Materials

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
- .1 Connector body and stud clamp for conductors.
- .2 Clamp for copper conductors.
- .3 Clamp for ACSR conductors.
- .4 Stud clamp bolts.
- .5 Bolts for copper conductors.
- .6 Sized for conductors as indicated.

PART 3 - EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of

unacceptable conditions immediately upon discovery.

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

3.2 Installation

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

3.3 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

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

.3 Waste Management: separate waste materials for reuse and recycling.

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

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 20 – Wire and Box Connectors (0-1000V).

1.2 Product Data

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

1.3 Delivery, Storage and Handling

.1 Packaging Waste Management: remove for reuse and recycling.

PART 2 - PRODUCTS

2.1 Building wires

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE.

PART 3 - EXECUTION

3.1 Field Quality Control

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform one (1) test using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 General Cable Installation

.1 Install cable in trenches in accordance with Section 33 65 76 Direct Buried Underground Cable Ducts.

.2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.4 Conductor length for parallel feeders to be identical.

.5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

3.3 Installation of Building wires

.1 Install wiring as follows:
- .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
- .2 In underground ducts in accordance with Section 33 65 76 – Direct Buried Underground Cable Ducts.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 Waste Management and Disposal

.1 Separate and recycle waste materials.

PART 2 - PRODUCTS

2.1 Support Channels

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended or set in poured concrete walls and ceilings.

PART 3 - EXECUTION

3.1 Installation

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.4 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.5 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.6 For surface mounting of two or more conduits use channels at 1500mm on centre spacing.

.7 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.8 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.9 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.10 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.

.11 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 References

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.3 Action and Informational Submittals

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

.2 Product Data:
.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.

1.4 Delivery, Storage Handling

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling.

PART 2 - PRODUCTS

2.1 Junction and Pull Boxes

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

PART 3 - EXECUTION

3.1 Junction, Pull Boxes and Cabinets Installation

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 Identification

.1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating voltage and phase or as indicated.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 References

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.3 Action and Informational Submittals

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

1.4 Delivery, Storage and Handling

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

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling.

PART 2 - PRODUCTS

2.1 Outlet and Conduit Boxes General

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

2.2 Galvanized Steel Outlet Boxes

.1 One-piece electro-galvanized construction.

.2 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.3 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.4 Extension and plaster rings for flush mounting devices in finished plaster tile walls.

2.3 Conduit Boxes

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.4 Fittings - General

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 - EXECUTION

3.1 Installation

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and

armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 References

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45, Rigid Metal Conduit.
- .3 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.

1.3 Action and Informational Submittals

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
- .1 Submit cable manufacturing data.

.3 Quality assurance submittals:
- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.4 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

PART 2 - PRODUCTS

2.1 Cables and Reels

.1 Provide cables on reels or coils.
  .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

.4 Reel and mark shielded cables rated 2,001 volts and above.

2.2 Conduits

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel, threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings with expanded ends.

.4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56, steel.

2.3 Conduit Fastenings

.1 One hole steel straps to secure surface conduits 50 mm and smaller.
  .1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5m on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 Conduit Fittings

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

2.5 Expansion Fittings for Rigid Conduit

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 Fish Cord

.1 Polypropylene.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Use rigid galvanized steel threaded conduit except where specified otherwise (all interior work within service rooms).

.3 Use electrical metallic tubing (EMT) for servicing lighting within washroom building.

.4 Use rigid PVC conduit underground.

.5 Use flexible metal conduit for connection to motors in dry areas and connection to surface or recessed fluorescent or LED fixtures.

.6 Minimum conduit size for lighting and power circuits: 19 mm.

.7 Bend conduit cold:
.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 19 mm diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.

3.3 Surface Conduits	.1	Run parallel or perpendicular to building lines.
	.2	Group conduits wherever possible on surface channels.
	.3	Do not pass conduits through structural members except as indicated.
	.4	Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.
3.4 Concealed Conduits	.1	Run parallel or perpendicular to building lines.
3.5 Conduits Underground	.1	Slope conduits to provide drainage.
3.6 Cleaning	.1	Proceed in accordance with Section 01 74 11 - Cleaning.
	.2	On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 Action and Informational Submittals

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for cables and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 Delivery, Storage and Handling

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

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

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect cables from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS N/A

PART 3 - EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously

installed under other Sections or Contracts are acceptable for cable installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 Cable Installation in Ducts

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

3.3 Markers

.1 Mark cable every 150 m along duct runs and changes in direction.

.2 Where markers are removed to permit installation of additional cables, reinstall existing markers.

3.4 Field Quality Control

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using qualified personnel.
.1 Include necessary instruments and equipment.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short circuits and grounds.
.1 Ensure resistance to ground of circuits is not less than 50 megohms.

.5 Pre-acceptance tests:
.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Acceptance Tests:
.1 Ensure that terminations and accessory equipment are disconnected.
.2 Ground shields, ground wires, metallic armour and conductors not under test.

.7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

3.5 Cleaning

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

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

.3 Waste Management: separate waste materials for reuse and recycling.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 Protection

.1 Repair damage to adjacent materials caused by cables installation.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 Action and Informational Submittals

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

.2 Shop Drawings:
- .1 Provide shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.

1.3 Delivery, Storage and Handling

.1 Ship fuses in original containers.

.2 Do not ship fuses installed in switchboard.

.3 Store fuses in original containers in moisture free location.

.4 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling.

1.4 Extra Materials

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

.2 Six spare fuses of each type and size installed up to and including 600 A.

PART 2 - PRODUCTS

2.1 Fuses - General

.1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.

.2 Fuses: product of one manufacturer.

2.2 Fuse Types

.1 Class J fuses.
  .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  .2 Type J2, fast acting.

PART 3 - EXECUTION

3.1 Installation

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.3 Ensure correct fuses fitted to assigned electrical circuit.

.4 Provide spare fuses.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 References

.1 CSA International
.1 CSA C22.2 No. 5, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.3 Action and Informational Submittals

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 Delivery, Storage and Handling

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

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

.3 Storage and Handling Requirements:
.1 Store circuit breakers in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Protect circuit breakers from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 Breakers General

.1 Moulded-case circuit breakers: to CSA C22.2 No. 5

.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Common-trip breakers: with single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
.1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.5 Circuit breakers to have minimum 10 kA symmetrical rms interrupting capacity rating.

2.2 Thermal Magnetic Breakers Design A

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 Optional Features

.1 Include, where required:
.1 On-off locking device.

PART 3 - EXECUTION

3.1 Installation

.1 Install circuit breakers as indicated.

3.2 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

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

.3 Waste Management: separate waste materials for reuse and recycling.

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

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 References

.1 Canadian Standards Association (CSA International).
- .1 CAN/CSA C22.2 No.4, Enclosed Switches.
- .2 CSA C22.2 No.39, Fuseholder Assemblies.

1.3 Action and Informational Submittals

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

1.4 Health and Safety

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

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

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

PART 2 - PRODUCTS

2.1 Disconnect Switches

.1 Fusible and non-fusible disconnect switch in CSA Enclosure, size as indicated.

.2 Provision for padlocking in on-off switch position by one lock.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuses: size as indicated.

.5 Fuseholders: to CSA C22.2 No.39, suitable without adaptors, for type and size of fuse indicated.

.6 Quick-make, quick-break action.

.7 ON-OFF switch position indication on switch enclosure cover.

.8 All disconnect switches, fusible and non-fusible types are to be rated "heavy duty".

2.2 Equipment Identification

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

PART 3 - EXECUTION

3.1 Installation

.1 Install disconnect switches complete with fuses if applicable.

_____END_____

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 11 00 Clearing and Grubbing.

1.2 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version)

PART 2 PRODUCTS

2.1 Not Used

PART 3 EXECUTION

3.1 Temporary Erosion And Sedimentation Control

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, sediment and erosion control drawings and sediment and erosion control plan, specific to site, that complies with the requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Stripping Of Topsoil

.1 Ensure that procedures are conducted in accordance with applicable Provincial requirements.

.2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.

.3 Handle topsoil only when it is dry and warm.

.4 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation as directed by Departmental Representative.

.5 Remove brush from targeted area by non-chemical means and dispose of as directed by Departmental Representative.

.6 Strip topsoil by scraper to depths as directed by Departmental Representative
.1 Avoid mixing topsoil with subsoil.

.7 Pile topsoil by mechanical hoe in berms in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2.5 - 3 m.

.8 Excess excavated material and topsoil to be disposed of offsite.

.9 Protect stockpiles from contamination and compaction.

.10 Cover topsoil that has been piled for long term storage, with hay or straw mulch or grass to maintain agricultural potential of soil.

3.3 Preparation of Grade

.1 Verify that grades are correct and notify Departmental Representative if discrepancies occur. Do not begin work until instructed by Departmental Representative.

.1 Grade area only when soil is dry to lessen compaction.

.2 Grade soil with scrapers re-establishing existing contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END

PART 1 GENERAL

1.1 Related Sections

.1 Section 31 23 33 - Excavation, Trenching and Backfilling.

.2 Section 32 91 21 – Topsoil Placement

1.2 References

.1 American Society for Testing and Materials (ASTM)
  .1 ASTM 698-91 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m).
  .2 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification (most recent version).
    .1 NSTIR Standard Specifications – Division 2, Section 10, Rough Grading.

1.3 Existing Conditions

.1 Establish precise field location of underground services before commencing work.

.2 Known underground and surface utility lines and buried objects are as indicated on site plan for guidance only.

.3 Refer to dewatering in Section 31 23 33 - Excavating Trenching and Backfilling.

.4 Refer to drainage requirements.

1.4 Protection

.1 Protect existing fencing, trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged,

restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris.

PART 2 PRODUCTS

2.1 Materials

.1 Fill material: in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

.2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Departmental Representative.

PART 3 EXECUTION

3.1 Grading

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Rough grade to follow depths indicated on details.

.3 Prior to placing fill over existing ground, scarify surface to depth of 150mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.4 Compact filled and disturbed areas to as follows:
85% under landscaped areas.
As specified or detailed for other areas of site.

.5 Do not disturb soil within branch spread of trees or shrubs to remain.

3.2 Testing

.1 Inspection and testing of soil compaction will be carried out by testing laboratory. Costs of tests will be paid by Departmental Representative except as indicated under Section 01 45 00, Testing and Quality Control.

3.3 Surplus Material

.1 Remove surplus material and material unsuitable for fill, grading or landscaping as directed by Departmental Representative.

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 01 33 00 – Submittal Procedures.
.2 Section 01 35 43 – Environmental Procedures.
.3 Section 02 41 13 – Selective Site Demolition.
.4 Section 33 42 13 – Underground Drainage Systems

1.2 General Requirements

.1 The Work under this section shall include the supply of labour, supervision, materials, equipment, and transportation necessary to complete excavation and backfill as shown on the Contract Drawings, per the Specifications, and as directed by the Departmental Representative, complete in every respect.

.2 Generally, the Work includes but is not necessarily limited to the following:
.1 Foundation excavations.
.2 Dewatering.
.3 Backfilling of select materials.
.4 Compacting fill materials.
.5 Removal from site all excavated materials except for material required for backfilling and grading.

.3 All work to be carried out in conformance with appended Basic Impact Analysis (BIA).

1.3 Measurement Procedures

.1 Work performed under this Section will be incidental to Work in other Sections.

1.4 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):
.1 NSTIR Standard Specification Division 2 Earthwork.

.2 Excavation limit as shown on the Plans.

1.5 Definitions

.1 Excavation class: one class of excavation will be recognized; common excavation.

.1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.4 Unsuitable materials:
.1 Weak, chemically unstable, and compressible materials.
.2 Frost susceptible materials:
.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
.2 Table:

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

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

1.6 Action and Informational Submittals

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

.2 Quality Control: in accordance with Section 01 45 00 – Testing and Quality Control:
.1 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.

.2 Submit to Departmental Representative written notice when bottom of excavation is reached.

.3 Preconstruction Submittals:
.1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
.2 Submit records of underground utility locates, indicating: clearance record from utility authority.

.4 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
.3 Submit 70 kg samples of type of fill specified including representative samples of excavated material.
.4 Ship samples prepaid to Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.

1.7 Quality Assurance

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

1.8 Waste Management And Disposal

.1 Separate waste materials for reuse.

.2 Divert excess materials from landfill to local facility for reuse as directed by Departmental Representative.

1.9 Existing Conditions

.1 Examine Borehole Logs available in attached Appendix A.

.2 Buried services:
- .1 Before commencing work establish location of buried services on and adjacent to site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
- .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .5 Prior to beginning excavation Work, notify applicable Departmental Representative and authorities having jurisdiction. Establish location and state of use of buried utilities and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations.
- .7 Maintain and protect from damage water, sewer, gas, electric, telephone and other utilities and structures encountered.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .9 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing buildings and surface features:
- .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
- .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
- .3 Where required for excavation, cut roots or branches as directed by Departmental

Representative in accordance with Section 31 11 00 – Clearing and Grubbing.

1.10 Archeological Definitions

.1 Archeological Site. While most of the sites will be subsurface or submerged; this is not a universal or necessary condition because a built heritage site and an archeological site exist in a continuum, and the inclusion of a given site in one category, or the other, may be somewhat arbitrary. For the purpose of this document, an archeological site is a surface vestige, or the subsurface, or submerged remains of human activity at which an understanding of these activities and the management of these resources can be achieved through the employment of archeological techniques.

.2 Archeological Artifact: An object, a component of an object, a fragment, or shred of an object that was for or used by humans; a soil, botanical or other sample of archeological investigation of a site.

.3 Archeological Records: Notes, drawings, photographs, plans, computer databases, reports and any other audio-visual records related to the archeological investigation of a site.

.4 Archeological Collection: Archeological artifacts and associated archeological records.

.5 Archeological Resource: An archeological site and its associated archeological collection.

1.11 Protection of Existing Features

.1 Existing buried utilities, services and structures:

.1 Prior to commencing excavation work, notify applicable owner or authorities having jurisdiction, establish location and state of use of buried utilities, services and structures. Clearly mark such locations to prevent disturbance during work.

.2 Submit plans and details to show how existing utilities and services are to be maintained and protected while completing trench excavations and installing new services and utilities in the immediate area.

.3 Record location of maintained, re-routed and abandoned underground utilities and services.

.4 Repair all services, utilities and structures damaged during construction to the satisfaction of the Departmental Representative using new materials equivalent in manufacture, class, size and shape to the existing. The cost of all repair work shall be borne by the Contractor.

.2 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, lawns, sea wall, service poles, wires, pavement, survey bench marks and monuments which may be affected.

.2 Protect existing buildings and surface features which may be affected by work from damage while work is in progress. In the event of damage, immediately make repair to approval of Departmental Representative.

.3 All surface modifications are restricted to the identified corridors. Construction corridors to be accurately located by field survey by the Contractor prior to commencement of work operations.

.4 All vehicle traffic is restricted to existing roadways or as indicated in project plans. Any deviation from the identified corridor requires Archeological review. A field visit will be scheduled with Contractor for locational confirmation and all areas of proposed construction will be marked in the field with orange flagging tape prior to commencement of work.

.5 The locational data for all encountered services and utilities that are to remain in service and all newly installed utilities and services will be provided in northing and easting (eg. N 5088673.329,

E 734175.481) referenced to UTM Zone 20, vertical datum CGVD28, to an accuracy of ± 2 cm. This locational information is to be provided on disk in a DWG and DXF format which is compatible with SPANS EXPLORER.

.6 Port Royal protects a large and complex archeological site. These archeological resources will be respected and maintained in accordance with Parks Canada Cultural Resources Guidelines.

.3 Archeological Features

.1 Conduct, with the Departmental Representative, condition survey of existing features which are designated for removal and items to remain.

.2 Prevent movement, settlement, and damage to adjacent structures, services, and parts of existing structures to remain. Provide bracing and shoring as required. In event of damage, immediately replace such items or make repairs to approval of the Departmental Representative at Contractor's cost.

.3 Relics, antiquities and items of historical or scientific interest found on site shall remain property of Parks Canada. Protect such articles and request directives from the Departmental Representative.

.4 Give immediate notice to the Departmental Representative if evidence of archaeological finds are encountered during construction, and await Representative's written instructions before proceeding with work in this area.

.5 An archaeologist representing Parks Canada may be present during excavation work. Archaeologist has authority to stop work when excavation uncovers archaeological resources.

.6 Suspend excavation so that appropriate recording and removal of archaeological resources can be completed. Provide labour assistance as necessary to the archaeologist during removal and recording of archaeological resources. There will be no additional payment to the Contractor as

a result of this provision of labour assistance and work suspension.

.7 Any other aspects of the work that might involve disturbance of existing surfaces, grade, walls, etc. may also be subject to archaeological surveillance.

.8 Prevent damage to existing structures, vents, foundations, walls, stairs, etc. and any other existing feature to remain.

.9 Conduct with the Departmental Representative a condition survey of existing structures, features, etc. which may be affected by the work.

.10 Protect existing surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.

.11 Make good any damage to approval of the Departmental Representative.

PART 2 PRODUCTS

2.1 Materials

.1 Clear stone: to NSTIR Division 3, Section 4 - Clear Stone C5

.1 Aggregates shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the work.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.3 Maximum Micro-Deval loss of 25% when tested to DOT & PW TM-1.

.4 Maximum freeze-thaw loss of 20% when tested to MTO LS 614.

.5 Plasticity Index to zero (0) when tested to ASTM D4318.

.6 Absorption to maximum 1.75% when tested to ASTM C127

.7 Table:

Sieve Designation	% Passing
28 mm	100
20 mm	90 – 100
10 mm	0 – 40
5 mm	0 - 10

.2 Backfill soils: to NSTIR Division 3, Section 10 – Fill Against Structure

.1 Aggregates shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration when exposed to the natural elements after placement in the work.

.2 Gradations to be within limits specified in Table 3.10.2 for 'Fill Against Concrete Structures' when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.3 Maximum LA Abrasion (Grading A) of 45 when tested to ASTM C131.

.4 Maximum Plasticity Index (sand portion) of 6 when tested to ASTM D4318.

.5 Table:

Sieve Designation	% Passing
	Table 3.10.2
80 000 µm	100
56 000 µm	70 – 100
28 000 µm	50 - 80
14 000 µm	35 – 65
5 000 µm	20 – 50
160 µm	5 – 12
80 µm	3 – 5

PART 3 EXECUTION

3.1 Site Preparation

.1 Remove obstructions from surfaces to be excavated within limits indicated.

3.2 Preparation/ Protection

.1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.4 Protect buried services that are required to remain undisturbed.

3.3 Stockpiling

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

3.4 Cofferdams, Shoring, Bracing and Underpinning

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and Health and Safety Act for the Province of Nova Scotia.
  .1 Where conditions are unstable, Departmental Representative to verify and advise methods.

.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.

.3 Construct temporary Works to depths, heights and locations as directed by Departmental Representative.

.4 During backfill operation:
.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.
.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

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

.6 Upon completion of substructure construction:
.1 Remove cofferdams, shoring and bracing.
.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.5 Dewatering and Heave Prevention

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

.2 Provide for Departmental Representative's review and approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cutoffs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

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

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in a manner not detrimental to public and private property, or portion of Work completed or under construction.
.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

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

3.6 Excavation

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

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

.3 Remove obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.

.4 Excavation will not interfere with bearing capacity of adjacent foundations.

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

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

.6 Keep excavated and stockpiled materials safe distance away from edge of excavation as directed by Departmental Representative.

.7 Restrict vehicle operations directly adjacent to open excavations.

.8 Dispose of surplus and unsuitable excavated material as directed by the Departmental Representative.

.9 Do not obstruct flow of surface drainage or natural watercourses.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.11 Notify Departmental Representative when bottom of excavation is reached.

.12 Obtain Departmental Representative approval of completed excavation.

.14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.15 Correct unauthorized over-excavation as follows:
.1 Fill under areas with Gravel Borrow (NSTIR Standard Specification Division 3 - Granular Materials, Section 1 - Gravel Borrow compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

.16 Hand trim, make firm and remove loose material and debris from excavations.
.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.7 Backfilling

.1 Do not proceed with backfilling operations until completion of following:
.1 Departmental Representative has inspected and approved installations and construction below finished grade.
.2 Inspection, testing, approval and recording location of underground utilities.
.3 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:
.1 Place bedding and surround material as specified elsewhere.
.2 Place layers simultaneously on both sides of installed Work to equalize loading.

Difference not to exceed 300 mm.

3.8 Restoration

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

.2 Replace topsoil as directed by Departmental Representative.

.3 Reinstate lawns to elevation which existed before excavation.

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

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

END

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 35 43 - Environmental Procedures

.3 Section 31 23 33 – Excavating, Trenching and Backfilling

1.2 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal, Highway Construction and Maintenance Standard Specifications.

.2 Nova Scotia Watercourse Alteration Specifications.

1.3 Environmental Protection Plan

.1 Provide Environmental Protection Plan in accordance with Section 01 35 43 – Environmental Procedures.

1.4 Submittals

.1 Provide shop drawings, in accordance with Section 01 33 00 – Submittal Procedures.

PART 2 – PRODUCTS

2.1 General

.1 Use sediment barriers to keep sediment on site. Consider sediment barriers as temporary perimeter controls to intercept sediment laden sheet flow runoff before it enters the watercourse or as it leaves the construction site.

2.2 Materials

.1 Straw barriers: straw bales to be dry, firm, tightly tied in at least two places, show no evidence of straw or tie decay and be free of sediment. They are to be of standard agriculture dimensions, approximately 600mm x 600mm x 1200mm.

.1 Straw barriers

.1 Stakes: of sufficient strength to satisfy control measure performance and maintenance requirements. Stakes to be 1.2m in length.

.2 Silt fence barriers: construct silt fence barriers of silt fence geotextile supported on stakes. Geotextile used for silt fence shall be woven Class 1 geotextile, having a minimum width of 900mm. The maximum filtration opening size (FOS) shall be 840µm.

.1 Stakes: of sufficient strength to satisfy control measure performance and maintenance requirements. Stakes to be 1.5m in length.

PART 3 - EXECUTION

3.1 GENERAL

.1 Supply, install and maintain temporary erosion and sedimentation control features where required and in accordance with Environmental Protection Plan. Do not remove control features until authorized by Departmental Representative.

.2 Fires and burning of rubbish on site is not permitted.

3.2 Sediment Control Berms

.1 Construct sediment control items to the cross sections shown, using materials indicated on the Drawings. Locate where indicated unless otherwise directed by Departmental Representative.

3.3 Silt Fence

.1 Install silt fence in the locations directed.

.2 Install extra 50 x 75 x 1200 mm long posts midpoints between supplied posts. Attach fence with roofing nails and roofing tins. Provide wood strapping along top of fence as shown.

.3 Excavate 150 x 150 mm trench along length of fence as indicated. Lay fabric bottom in trench and backfill with selected backfill material.

3.4 Straw Barriers

.1 Where straw bale barriers are to be installed on earth surfaces, place the bale in a trench measuring 750mm wide by 150mm deep at the location specified for the barrier. The bales will then be staked and the remaining trench space backfilled and compacted to existing grade.

.2 Where straw bale barriers are to be installed on sod, erosion control blanket or existing turf, place so that there are no gaps between the bales and the underlying cover.

.3 Do not place straw bale ties in contact with the ground. The ends of adjacent bales are to be placed tightly against one another to prevent gaps.

.4 Firmly secure in place each bale by two (2) stakes spaced 150mm from the end of each bale. Drive stakes flush with the top of bale.

.5 Maintain straw barriers such that bales remain firm intact and without decay.

.6 Include at each end of the barrier a 2m to 3m section, angled upstream to direct runoff to the main section of the barrier.

.7 Replace bales when they are no longer functioning or as directed by the Departmental Representative.

3.5 Maintenance

.1 Maintain erosion and sediment control features throughout the construction period. Repair damage to original condition.

.2 Remove accumulated sediment from behind sediment control items when and as directed by the Departmental Representative.

.3 Maintain vertical alignment of silt fence such that it is always plumb and straight.

.4 Remove sedimentation control features when directed by the Departmental Representative. Take care to avoid causing turbidity, and excessive re-suspension of particles when removing sediment control features.

END

PART 1 GENERAL

1.1 Related Requirements

1.2 References

.1 American Society for Testing and Materials International, (ASTM)
  .1 ASTM D 4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
  .2 ASTM D 4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
  .3 ASTM D 4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)

  .1 CAN/CGSB-4.2 No. 11.2-M89 (April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).

  .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification (most recent version):
  .1 NSTIR Standard Specification Division 6 - Miscellaneous, Section 12 – Geotextiles.

1.3 Submittals

.1 Submit to Departmental Representative following samples at least 2 weeks prior to beginning Work.
  .1 Minimum length of 2 metres of roll width of geotextile.

1.4 Delivery, Storage And Handling

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

PART 2 PRODUCTS

2.1 Materials

.1 Physical properties: Heavy Weight. GrAb Tensile 1100 N min, Mullen Burst 3000 kPa min, filtration opening size 50 um min - 150 um max, Hydraulic conductivity 0.01 cm/sec.

.2 Geotextile: woven synthetic fibre fabric, supplied in rolls.
- .1 Width: 3.5 metres minimum
- .2 Length: 79 metres minimum
- .3 Composed of: minimum 85% by mass of polypropylene and/or polyester, with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 30 days.

.3 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m^2 to CAN/CSA G164.

.4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 EXECUTION

3.1 Installation

.1 Place geotextile material, as indicated on drawings and as directed by Departmental Representative, by unrolling onto graded surface and retain in position with securing pins or fill.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 300 mm over previously laid strip.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 4 hours of placement.

.7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.8 Place and compact soil layers in accordance with Section 31 23 33 – Excavating, Trenching and Backfilling.

3.2 Cleaning

.1 Remove construction debris from project site and dispose of debris in an environmentally responsible and legal manner.

3.3 Protection

.1 Vehicular traffic not permitted directly on geotextile.

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 23 33 Excavating, Trenching and Backfilling.

1.2 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification (most recent version).

.1 NSTIR Standard Specification, Division 3 Granular Materials, Section 6 Loose Laid Rip Rap.

PART 2 PRODUCTS

2.1 General

.1 All materials to be supplied by the contractor in quantities as indicated and specified.

2.2 STONE

.1 Hard, durable, angular quarry stone, free from seams, cracks or other structural defects, to meet the size distribution for use intended, as shown below in the table.

.2 Table: Random Rip Rap Grading Limits: (see next page)

Mass	Size (Note 1)		Finer by Mass (%)							
(kg)	(mm)	R-A (Note 2)	R-5	R-25	R-50	R-100	R-250	R-500	R-1000	R-2000
6000	1600									100
4000	1400									70-90
3000	1300								100	
2000	1100								70-90	40-55
1500	1000							100		
1000	900							70-90	40-55	
750	820						100			
500	710						70-90	40-55		
300	600					100				
250	570						40-55			
200	530					70-90				0-15
150	480				100					
100	420				70-90	40-55			0-15	
75	380			100						
50	330			70-90	40-55			0-15		
25	260			40-55			0-15			
15	220	100	100							
10	190		70-90			0-15				
5	150		40-55		0-15					
2.5	120	0		0-15						
0.5	70		0-15							
Thickness (mm) (note 3)		300	300	500	600	800	1100	1400	1600	2200

NOTES: 1) Approximate Diameter (for information only)
2) Random riprap for abutment and slope protection
3) Measured perpendicular to the prepared surface

2.3 Geotextile Filter

.1 Geotextile: as indicated in drawings and in accordance with Section 31 32 19 - Geotextiles.

PART 3 EXECUTION

3.1 Placing

.1 Where riprap is to be placed on slopes excavate trench at toe of slope as indicated.

.2 Fine grade area to be riprapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.3 Place geotextile on prepared surface in accordance with Section 31 32 19 - Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile is not permitted.

.4 Place riprap to thickness as indicated on the table.

.5 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 23 13 Rough Grading

1.2 REFERENCES

.1 CAN/CGSB-15.1-92 Calcium Chloride

PART 2 PRODUCTS

2.1 Materials

.1 Supply water and calcium chloride in quantities and at times as directed by Departmental Representative.

.1 Water: to Departmental Representative's approval.

.2 Calcium chloride: Type I to CAN/CGSB-15.1, 35% aqueous solution.

PART 3 EXECUTION

3.1 General

.1 The Contractor shall use dust control throughout the construction site.

.2 Contractor is to use water as the primary method of dust control.

.3 Contractor is responsible for having proper equipment necessary for applying water to the area at all times throughout the contract.

.4 If the contractor fails to provide dust control to the satisfaction of the Departmental Representative, the Departmental Representative will provide such controls as necessary and costs for such measures will be deducted from the Contractor's final progress claim.

3.2 Application

.1 Provide dust control on an on-going basis, including weekends and holidays, with equipment approved by Departmental Representative, at an appropriate rate to reduce dust as directed by the Departmental Representative.

.2 Apply water and/or aqueous calcium chloride with distributors equipped with means of shut-off and with spray system to ensure uniform application.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 31 23 33 - Excavating, Trenching and Backfilling.

.2 Section 33 05 14 - Catch Basins.

1.2 References

.1 American National Standards Institute (ANSI)/American Water Works Association (AWWA)
.1 ANSI/AWWA C500-[09], Metal-Seated Gate Valves for Water Supply Service (Includes Addendum C500a-95).
.2 ANSI/AWWA C504-[10], Rubber-Seated Butterfly Valves.
.3 ANSI/AWWA C508-[09], Swing-Check Valves for Waterworks Service, 2 inch (50 mm) through 24 inch (600 mm) NPS.

.2 ASTM International
.1 ASTM C 478M-[11], Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric].

.3 Canada Green Building Council (CaGBC)
.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum [2007]).
.2 LEED Canada-NC-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.
.3 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
.4 LEED Canada-EB: O&M-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.4 CSA International
.1 CAN/CSA-A257 Series-[09], Standards for Concrete Pipe.
.2 CSA B70-[06], Cast Iron Soil Pipe, Fittings and Means of Joining.

1.3 Scheduling

.1 Schedule work to minimize interruptions to existing services.

.2 Construct temporary sump to keep excavations free of standing water during construction.

1.4 Action And Informational Submittals

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for lift station components and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.
.2 Submit drawings for civil, structural, hydraulic, mechanical and electrical elements.

1.5 Closeout Submittals

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

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

.3 Include information as follows:
.1 Record drawings, wiring diagrams, electrical schematics of equipment as installed.

.2 Interconnections with numbers and wire sizes.
.3 Certified pump characteristic curves.
.4 Detailed operation and maintenance instructions.
.5 Parts list comprising complete schedule clearly identified to facilitate re-ordering.

1.6 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect pumps and other equipment from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 Description

.1 Reinforced concrete enclosure.
.1 Pumping system: factory assembled and disassembled for shipment with mating components clearly identified.
.2 Principal items of equipment to include [2] identical submersible sewage pumping units, internal piping and valves, liquid level controls, lifting chains, guide bars, debris screen/ grate, vents complete with screens, cover, electrical wiring, control panel with circuit breakers and motor

starters.

.2 Equipment and installation including as follows:
.1 Excavation for sewage lift station.
.2 Placement of mud slab (if required).
.3 Connection of power to control panel as indicated.
.4 Supply and installation of all required equipment in accordance with manufacturer's recommendations.

.3 Wet well sewage lift station:
.1 Fully automatic, consisting of duplex submersible pumps mounted on rail system.
.1 Ensure control is by series of liquid level bulbs.
.2 Ensure pumps alternate as lead pump on each cycle.
.3 Incorporate time delay relays in control circuits to allow continuation of pump for pre-set time after normal pump shut down signal is received.
.4 Operate both pumps when lag pump "on" water level is reached in wet well.
.1 Ensure lag pump shuts off when water level drops to pump "off" water level.
.5 Locate control system in control station mounted above lift station cover plate.

2.2 Wet Well Structure

.1 Structure : leak free, precast reinforced concrete with access opening, ladder and designed for following forces:
.1 Dead load of station and components, dynamic and kinetic forces of rotating equipment.
.2 Dead load from soil over structure, superimposed live load of 12 kN/m^2 or single wheel load of 54 kN over area of 750 x 750 mm.
.3 Hydrostatic uplift forces.
.4 Horizontal earth loading and full hydrostatic pressure assuming water at ground level, elevation approximately +6.5 m.

.2 Materials:
.1 Precast concrete to CAN/CSA-A257.

2.3 Pumps

.1 Two [2] vertical, single stage, bottom suction, non-clog, heavy duty, totally submersible centrifugal pumps, direct connected to motor by solid stainless steel shaft and fitted with thrust bearings.

.2 Characteristics:
.1 Each pump shall be rated to 2 HP, 575 volts, 3-phase and 6 hertz.
.2 The unit shall produce 100 U.S. GPM at 15 feet total dynamic head.
.3 Maximum speed: 1750 rpm.

.3 The pump shall be non-overloading throughout entire range of operation without employing service factor. The pump shall reserve a minimum service factor of 1.20. The performance curve submitted for approval shall state in addition to head and capacity performance, the pump efficiency and solid handling capability.

.4 Volute casing: cast iron, minimum grade ASTM A-48 Class 30, close coupled.

.5 Impeller: bronze, in static and dynamic balance. All fasteners exposed to pumped liquids shall be stainless steel.

.6 Capable of passing 75 mm solid sphere.

.7 All external mating parts shall be machined and BUNA N rubber O-ring sealed on a beveled edge. Gaskets shall not be acceptable.

2.4 Pump Lifting System

.1 Ensure pumps are complete with sliding guide and brackets, chains and quick leak-proof disconnect to discharge piping, all allowing for withdrawal of pumps.

.2 Include galvanized lifting chain or stainless steel cable for each pump accessible from roof access hatches.

.3 Use galvanized steel pipe as quick rails for pump.

2.5 Submersible Motors

.1 Motors:

.1 3 phase.
.2 Capable of operating pump at any point on selected impeller curve without exceeding motor nominal rating.
.3 Fully overload protected.
.4 Assembly capable of operating continuously in air without overheating.
.5 Complete with NEMA approved winding temperature sensor.
.6 Motors shall use magnetic starters with overload relays located in the control panel for further protection.

.2 Motor speed: maximum 1750 rpm.

.3 Motor enclosure and seal housing: sealed submersible type housing, corrosion resistant, completely watertight, cast iron. The stator windings shall have Class F insulation (155°C or 311°F) and dielectric oil-filled motor, NEMA B design.

.4 Bearing: anti-friction type, greasable, with lubrication lines and fittings, [50,000] hours minimum, [B-10] life.

.5 Terminal box: watertight, with waterproof cable entry glands mounted at motor.

.6 Shaft seals: double mechanical seals with tungsten/carbide faces.

.7 Motor leads and power cords to be sealed and locked in place using strain bushings. All cables to be waterproof.

.8 Stators shall be securely held in place with threaded fasteners so they may be easily removed in the field without the use of heat or press. Stators held by a heat shrink fit shall not be acceptable. Stators must be capable of being repaired or rewound by a local motor service station. Units that require service only by the factory shall not be acceptable. No special tools shall be required for pump and motor disassembly.

.9 Electrical power cord shall be STW-A, water resistant 600V, 60°C, UL and CSA approved. Pump shall be double protected with compression fitting and an epoxy potted area at the power cord entry to the pump. Power cable entry into cord cap assembly shall first be made with a compression fitting. Power cord assembly shall then be connected to the motor leads with insulated butt connectors rather than a terminal board that allows for possible leaks.

2.6 Pump Control System

.1 Liquid level switches: shock-proof mercury switches enclosed in leak-proof polypropylene body.

.2 Include independently adjustable control levels as follows:
- .1 Lead pump start level.
- .2 Lead pump stop level.
- .3 Lag pump start level.
- .4 Lag pump stop level.
- .5 High water alarm.

.3 Ensure lead pump and lag pump controls include alternator relay to provide automatic pump alteration for each pumping cycle when pump sequence selection switch is on automatic.

2.7 Piping And Valves

.1 Cast iron pipe, fittings and joints: to CSA B70, 100 mm minimum.

.2 Butterfly valves: to ANSI/AWWA C504.

.3 Gate valves: solid wedge, Class 125, flanged, to ANSI/AWWA C500.

.4 Check valves: Class 125, swing check type, spring loaded lever, stainless steel shaft, to ANSI/AWWA C508.

2.8 Electrical Control Panel And Wiring

.1 Use only CSA approved components.

.2 Electrical equipment in station in accordance with requirements for Hazardous Locations, Class 1, Group D, Division 2.

.3 Control at the station shall be achieved through the use of a relay-based pump controller capable of achieving the following real time tasks:
.1 Control pump station operation,
.2 Alarm detection and annunciation,
.3 Pump alternation,
.4 Pump lockouts,
.5 Safety interlocking,
.6 Automatic transfer to standby (lag) in the event of lead pump failure,
.7 Interfacing of pump monitoring sensors to the relay logic,
.8 Interfacing of Hand-Off-Auto selector switches to the relay logic.

.4 Panel enclosure to be an industrial quality heavy gauge, stainless steel or fiberglass panel meeting EEMAC 4x requirements. Panel shall include fully hinged aluminum inner door capable of opening 90 degrees for full access to all backplate mounted devices.

.5 Ensure panel is complete with required components including:
.1 Main circuit breaker with thermal magnetic trip and suitable current rating for station load.
.2 3-phase ground detector, neon lamp type with resistors and fuse cut-outs.

.3 Motor circuit interruptor with toggle handle for each pump motor with adjustable instantaneous trip.
.4 Magnetic full voltage starter with 120 volts coils and 3 overload relays for each pump.
.5 Time delay-relay, 2 - 50 second range, 10 amp minimum resistive contacts to prevent concurrent starting of pumps after power restoration.
.6 Dry contacts, normally open, on high water alarm relay for remote indication.

.6 Mount following switches and instrumentation on door of panel:
.1 Pump mode selector switches for hands-off-automatic operation of each pump.
.2 Pump sequence selector switch to permit override of automatic pump alternation and selection of either pump to run as lead pump.
.3 High level alarm complete with alarm relay and red light on panel door.

.7 Terminals in circuit of start float switch of lag pump.

.8 Ground connection lug.

.9 Labels: all components on and inside panel to indicate operating routine.
.1 Labels: anodized aluminum with 5 mm minimum letters.

.10 Schematic wiring diagram: mounted inside panel door, varnish protected.

.11 Conductors: copper.

.12 Control wiring: number 16 AWG minimum, stranded type TEW.

.13 Power wire: number 10 AWG minimum, type RW 90.

.14 Wire:
.1 Numbered with printed permanent indelible identifying plastic tapes to correspond to schematic diagram.
.2 Terminated for external control

connections by tubular screw type terminal blocks with barrier and labels.
.3 Equipped with grommet and shields for mechanical protection.
.4 Adequately supported and installed in accordance with written approval of Departmental Representative.

2.9 Package System

.1 Precast concrete enclosure complete with components specified.

2.10 Source Quality Control

.1 Perform operational tests on pumps at factory to check for excessive vibration, for leaks in piping or seals and for correct operation of automatic control system and auxiliary equipment. Pump suction and discharge lines to be coupled to reservoir and pumps to recirculate water for minimum of 1 hour under simulated service conditions.

.2 Provide certification that pumps and controls have been factory tested and deficiencies rectified prior to delivery to site.

PART 3 - EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sewage lift installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and

after receipt of written approval to proceed from Departmental Representative.

3.2 Excavation Backfilling And Compaction

.1 Excavate, backfill and compact in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling and as indicated.

3.3 Equipment Installation

.1 Install equipment, piping and controls in accordance with manufacturers' recommendations.

3.4 Field Quality Control

.1 After completion of installation, demonstrate functional operation of systems, including sequence of operation, to approval of Departmental Representative.

.2 Test in presence of Departmental Representative and representative from equipment supplier.

.3 Provide labour and ancillary equipment necessary to fulfill tests.

.4 Test to demonstrate that:
.1 Pumps and equipment run free from heating, or vibration.
.2 Operation meets requirements of these specifications.
.3 Pumps and pumping are free and clear of debris and obstructions.

.5 Replace equipment found defective.
.1 Repeat test until equipment is accepted by Departmental Representative.

3.5 Demonstration

.1 Operating Personnel Training

.1 Provide on site training by qualified personnel for designated operating personnel prior to final commissioning.

.1 Schedule and deliver training in accordance with training plan approved in writing by Departmental Representative.

.2 Include training for [3] designated personnel on routine maintenance procedures, minor repairs, replacement of parts, including disassembly of major components.

.3 Include safety precaution procedures for systems.

3.6 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

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

.3 Waste Management: separate waste materials for reuse and recycling.

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

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 22 13 - Rough Grading

1.2 Payment Procedures

.1 Testing of topsoil: Departmental Representative will pay for cost of tests as specified in Section 01 00 02.

1.3 References

.1 Agriculture and Agri-Food Canada
.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment PN1340-2005, Guidelines for Compost Quality.

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

.4 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification (most recent version):
.1 NSTIR Standard Specification - Division 7 - Environmental Protection, Section 8 - Topsoil.

1.4 Definitions

.1 Compost:
.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
.3 Product will be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25, and contain no toxic or growth inhibiting contaminates).

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

1.5 Submittals

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

.2 Quality control submittals:
.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 Quality Assurance

.1 Perform Work in accordance with the projects Erosion and Sedimentation Control Plan as specified in Section 01 35 43 - Environmental Procedures.

.2 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Division 1.

1.7 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Division 1.

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.1 Topsoil

.1 Existing Topsoil: if available, to be used on all areas in amended form, salvaged topsoil to meet following criteria:
  .1 50% sand maximum and 3 to 10% organic content.
  .2 Fertility: major soil nutrients present in following ratios:
    .1 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
    .2 Natural Phosphorus (P): 10 to 20 micrograms of phosphate per gram of topsoil.
    .3 Potassium (K): 80 to 120 micrograms of potash per gram of topsoil.
    .4 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
  .3 pH value: 6.0 – 7.5
  .4 Contain no toxic elements or growth inhibiting materials.
  .5 Free from:
    .1 Debris and stones over 10 mm diameter.
    .2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
  .6 Consistence: friable when moist.
  .7 Double screen salvaged topsoil to remove all stones over 10 mm diameter.

2.2 Soil Amendments

.1 Fertilizer:

  .1 Fertility: major soil nutrients present in following amounts:
  .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
  .3 Natural Phosphate products (P): 40 to 50 micrograms of phosphate per gram of topsoil.
  .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

.5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
.6 pH value: 5.5 to 7.5.

.2 Peatmoss:
.1 Derived from partially decomposed species of Sphagnum Mosses.
.2 Elastic and homogeneous, brown in colour.
.3 Free of wood and deleterious material which could prohibit growth.
.4 Shredded particle minimum size: 5 mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: compost Category A, B in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.5 Limestone:
.1 Ground agricultural limestone.
.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.6 Fertilizer: industry accepted "phosphate free" standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2.3 Source Quality Control

.1 Advise Departmental Representative of sources of topsoil and manufactured topsoil to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to existing topsoil and to supply topsoil as specified.

.3 Soil testing by recognized testing facility for pH, P and K, and organic matter. Soil test to identify

amendments necessary to meet requirements for topsoil as specified.

.4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 EXECUTION

3.1 Temporary Erosion and Sedimentation Control

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Stripping of Topsoil

.1 Begin topsoil stripping of areas as indicated after area has been cleared of brush weeds and grasses and removed from site.

.2 Strip topsoil to depths as directed by Departmental Representative.
.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Stockpile in locations as indicated.
Stockpile height not to exceed 2000-2500mm.

.4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative.

.5 Protect stockpiles from contamination and compaction.

3.3 Preparation of Existing Grade

.1 Verify that grades are correct.

.2 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.3 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.4 Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials.
.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
.2 Remove debris which protrudes more than 50 mm above surface.
.3 Dispose of removed material off site.

.5 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.4 Placing and Spreading of Topsoil/ Planting Soil

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 For sodded areas keep topsoil 15 mm below finished grade.

.4 Spread topsoil as indicated to following minimum depths after compaction to 85% Modified Proctor Density.
200 mm for sodded areas.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 Soil Amendments

.1 Apply soil amendments with rules as specified and as determined by soil sample test.

3.6 Finish Grading

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  .1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
  .1 Leave surfaces smooth, uniform and firm against deep foot printing.

3.7 Acceptance

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.8 Surplus Material

.1 Dispose of materials except topsoil not required where directed by Departmental Representative.

3.9 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

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

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 23 33 – Excavating, Trenching and Backfilling.

.3 Section 32 91 21 - Topsoil Placement.

1.2 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification (most recent version):
  .1 NSTIR Standard Specification, Division 7 - Environmental Protection Section 8 - Topsoil.

1.4 Administrative Requirements

.1 Scheduling:
  .1 Schedule sod laying to coincide with preparation of soil surface.
  .2 Schedule sod installation when frost is not present in ground.
  .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section [01 31 19 - Project Meetings].

1.5 Submittals

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit [2] copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples.
.1 Submit:
.1 Sod for each type specified.
.1 Install approved samples in one square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.
.2 Bio-degradable geotextile fabric.
.3 0.5 kg container of fertilizer.
.2 Obtain approval of samples by Departmental Representative.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.6 Quality Assurance

.1 Perform Work in accordance with the project Erosion and Sedimentation Control Plan as specified in Sections 01 35 43 – Environmental Procedures and 31 25 00 – Erosion and Sediment Control.

1.7 Delivery, Storage and Handling

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

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

1.8 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Division 1.

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.2 Materials

.1 Commercial Grade Turf Grass Nursery:
  .1 Mow sod at height directed by Departmental Representative within 36 hours prior to lifting, and remove clippings.
  .2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.

.2 Sod establishment support:
  .1 Geotextile fabric: biodegradable, square mesh.
  .2 Wooden pegs: [17 x 8 x 200] mm.
  .3 Biodegradable starch pegs: [17 x 8 x 200] mm

.3 Water:
  .1 Supplied by Departmental Representative at designated source.

.4 Fertilizer:
.1 To Canada "Fertilizers Act" and Fertilizers Regulations.
.2 Complete, synthetic, slow release with [65] % of nitrogen content in water-insoluble form.

2.2 Source Quality Control

.1 Obtain written approval from Departmental Representative of sources of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

PART 3 EXECUTION

3.1 Examination

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

3.2 Preparation

.1 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.2 Fine grade surface free of humps and hollows to smooth, even grade, to tolerance of plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.

.3 Remove and dispose of weeds; debris; stones [50] mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site or as directed by Departmental Representative.

3.3 Sod Placement

.1 Lay sod within [24] hours of being lifted if air temperature exceeds 20 degrees C.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.4 Fertilizing Program

.1 Fertilize during establishment and warranty periods.

3.5 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .1 Clean and reinstate areas affected by Work.

.3 Waste Management: separate waste materials for reuse, compost, and recycling.

.1 Remove recycling and compost containers and bins from site and dispose of materials at appropriate facility.
.2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.6 Protection Barriers

.1 Protect newly sodded areas from deterioration with snow fence on rigid frame or as directed by Departmental Representative.

.2 Remove protection 2 weeks after installation as directed by Departmental Representative.

3.7 Maintenance During Establishment Period

.1 Perform following operations from time of installation until acceptance.
.1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
.2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.

3.8 Acceptance

.1 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
.1 Sodded areas are properly established.
.2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.
.3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
.4 Sodded areas have been cut minimum 2 times prior to acceptance.
.5 Fertilizing in accordance with fertilizer program has been carried out at least once.

.2 Areas sodded in fall will be accepted in following

spring one month after start of growing season provided acceptance conditions are fulfilled.

3.9 Maintenance During Warranty Period

.1 Perform following operations from time of acceptance until end of warranty period:
- .1 Water sodded areas at weekly intervals to obtain optimum soil moisture conditions to depth of 75 to 100 mm.
- .2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.
- .3 Cut grass and remove clippings that will smother grass as directed by Departmental Representative to height as follows:
  - .1 Commercial Grade Turf Grass Nursery Sod:
    - .1 60 mm during normal growing conditions
  - .2 Cut grass at 2 week intervals or as directed by Departmental Representative, but at intervals so that approximately one-third of growth is removed in single cut.
  - .3 Fertilize areas in accordance with fertilizing program.
  - .4 Eliminate weeds by mechanical or chemical means to extent acceptable to Departmental Representative.

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 23 33 Excavating, Trenching and Backfilling.

.2 Section 33 42 18 Pipe Culverts.

1.2 Description

.1 All work in this section shall comply with the requirements of the most recent version of the NSTIR Standard Specifications Division 5, Structures, Section 12 – Underground Drainage Systems.

1.1 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):

.1 NSTIR Standard Specification Division 5, Structures, Section 12 – Underground Drainage Systems.

PART 2 PRODUCTS

2.1 Materials

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):

.1 NSTIR Standard Specification Division 5, Structures, Section 12, Underground Drainage Systems, 4.2 Catch Basins and Manholes.

PART 3 EXECUTION

3.1 General

.1 As per the requirements of the most recent version of the NSTIR Standard Specification.

3.2 Trenching

.1 Do trenching work in accordance with Section 31 23 33 – Excavating, Trenching and Backfilling.

.2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

3.3 Bedding

.1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.

.2 For structures place minimum thickness of 150 mm of approved granular material on bottom of excavation and compact to minimum 95% maximum density to ASTM D 698.

.3 Place bedding in unfrozen condition.

3.4 Installing Structures

.1 Set precast unit on approved bedding plumb and at the correct elevation.

.2 Plug lifting holes with precast concrete plugs set in cement mortar.

3.5 Backfilling

.1 Backfill around catch basin as indicated or as directed by Department of Supply and Services Representative.

.2 Place granular backfill material, approved by Department of Supply and Services Representative, in 300 mm layers to full width, alternately on each side of the structure, so as not to displace it laterally or vertically.

.3 Compact each layer to 95% maximum density to ASTM D698.

.4 Place backfill in unfrozen condition.

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 31 23 33 Excavating, Trenching and Backfilling.

.2 Section 31 37 00 Rip Rap.

1.2 Description

.1 All work in this section shall comply with the requirements of the most recent version of the NSTIR Standard Specifications Division 5, Structures, Section 12 – Underground Drainage Systems.

.2 Work under this section includes underground drainage system around bunker as well as replacement culvert following lift station discharge

1.3 References

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):
.1 NSTIR Standard Specification Division 5, Structures, Section 12 – Underground Drainage Systems.

PART 2 PRODUCTS

2.1 Materials

.1 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specifications (most recent version):

.1 NSTIR Standard Specification Division 5, Structures, Section 12, Underground Drainage Systems:
.1 4.1.4 Polyvinyl Chloride (PVC) Pipe
.1 PVC DR 35 to CSA B182.1 and B182.2
.2 4.1.5 High Density Polyethylene (HDPE) Pipe
.1 HDPE to CSA B182.8
.2 Perforated Drain – PVC DR 35 to CSA B182.1 and B182.2

PART 3 EXECUTION

3.1 General

.1 As per the requirements of the most recent version of the NSTIR Standard Specification.

.2 Existing pipes shall be disposed of.

3.2 Trenching

.1 Do trenching work in accordance with Section 31 23 33 – Excavating, Trenching and Backfilling.

.2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

3.3 Bedding

.1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.

.2 For pipes place minimum thickness of 150 mm of approved granular material on bottom of excavation and compact to minimum 95% maximum density to ASTM D 698.

.3 Bed outlet pipes in embankment material only.

.4 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Departmental Representative, free from sags or high points.

.5 Place bedding in unfrozen condition.

3.4 Laying Pipes

.1 Begin at downstream end of pipe with flanged end of first pipe section facing upstream.

.2 Ensure barrel of each pipe is in contact with shaped bed throughout its length.

.3 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

3.5 Backfilling

.1 Backfill around and over pipes as indicated or as directed by Department Representative.

.2 Place granular backfill material, approved by Department Representative, in 200 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.

.3 Compact each layer to 95% maximum density to ASTM D 698 taking special care to obtain required density under haunches.

.4 Protect installed pipe with minimum 1 metre cover of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.

.5 Place backfill in unfrozen condition.

END

PART 1 - GENERAL

1.1 Related Requirements

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 Action and Informational Submittals

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 Quality Assurance

.1 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Certificates: signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

1.4 Delivery, Storage and Handling

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

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

.3 Packaging Waste Management: remove from site.

PART 2 - PRODUCTS

2.1 PVC Ducts and Fittings

.1 Rigid PVC duct: Type DB2/ES2 to be manufactured to CSA B196.3.
.1 Nominal length: 6 or 3 m plus or minus 12 mm.

.2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make a complete installation.

.3 Rigid PVC 90 degrees, 45 degrees bends and 5 degrees angle couplings as required.

2.2 Solvent Weld Compound

.1 Solvent cement for PVC duct joints.

2.3 Cable Pulling Equipment

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.4 Warning Tape

.1 Standard 4-mil polyethylene 76 mm wide tape, yellow with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW ".

PART 3 - EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Install duct in accordance with manufacturer's instructions and at elevations as indicated.

.2 Clean inside of ducts before laying.

.3 Slope ducts with 1 to 400 minimum slope.

.4 Install plugs and cap both ends of ducts to prevent entrance of foreign materials during and after construction.

.5 Pull through each duct steel mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign material.
.1 Pull stiff bristle brush through each duct immediately before pulling-in cables.

.6 Install a pull rope continuous throughout each duct run with 3 m spare rope at each end.

.7 Place continuous strip of warning tape 300 mm above duct before backfilling trenches.

.8 Install markers as required.

.9 Notify the Departmental Representative for field review upon completion of direct buried ducts and obtain acceptance prior to backfill.

3.3 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling.

END

PART 1 GENERAL

1.1 Related Requirements

.1 Section 01 35 43 – Environmental Procedures

.2 Section 33 42 13 – Under Ground Drainage Systems

1.2 Environmental Requirements

.1 Operation of construction equipment in water is prohibited.

.2 Use borrow material from watercourse beds only after receipt of written approval from Departmental Representative.

.3 Design and construct temporary crossings to minimize environmental impact to watercourse.

.4 Constructing temporary crossings of watercourses where spawning beds are indicated is prohibited.

.5 Dumping excavated fill, waste material, or debris in watercourse or wetland is prohibited.

1.3 References

.1 U.S. Environmental Protection Agency (EPA) / Office of Water.

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 Action and Informational Submittals

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

.2 Sustainable Design Submittals:

.1 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 and authorities having jurisdiction.

PART 2 PRODUCTS

2.1 Not Used

.1 Not Used.

PART 3 EXECUTION

3.1 Existing Conditions

.1 Maintain existing flow pattern in natural watercourse systems.

.2 In natural systems maintain existing riffle pool and step pool patterns.

3.2 Site Clearing and Plant Protection

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

.2 Minimize disturbance to vegetated buffer zones and protect trees and plants on site and adjacent properties where indicated.

.3 Wrap trees and shrubs adjacent to construction work, storage areas and trucking lanes in burlap.

.4 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
- .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.5 Leave cuttings from trees and other vegetation on site as brush piles to allow for natural degradation.

.1 Secure large piles with degradable materials to prevent interference with watercourse.

.6 Remove only trees that may offer future blockage problems as instructed by Departmental Representative.

.7 Leave roots mass and stumps in place.

.8 Maintain temporary erosion and pollution control features installed under this contract.

3.3 Drainage

.1 Pumping water containing suspended materials into watercourse is prohibited.

.2 Establish rock chute spillways to accommodate safe surface water entry to watercourse as directed by Departmental Representative.

3.4 Site Restoration

.1 Establish vegetated buffer zones with suitable vegetation to minimum 3 m along edge of watercourse banks as determined by Departmental Representative.

.2 Plant vegetation natural to area, suitable for application without requirement for fertilizers, pesticides and other chemicals.

.3 Control stream bank erosion in lower section of watercourse with irregular shaped riprap underlain with non-toxic filter cloth of size determined by Departmental Representative.

.4 Control stream bank erosion in upper section of watercourse by planting suitable vegetation as directed by Departmental Representative.

.1 Ensure planting occurs within 7 days after work on watercourse is complete.

END

Appendix A
Borehole Logs and Lab Summary

Public Works and Government Services Canada
Travaux Publics et Services gouvernementaux Canada

GEMTEC
Consulting Engineers and Scientists

HABITATION

POTABLE WELL

EXISTING WELL

MW3
10.84 (TOP OF MT)

MW2

MW1

GENERATOR BUILDING

MAINTENANCE BUILDING

BUNKER

EXCAVATION LIMITS

HYDRANT AND VALVE C/W 200x200x150 TEE & THRUST BLOCK TYPICAL

0+000
0+020
0+040
0+060
0+080
0+095.50
0+106.453
0+010.845

SCALE: 1:200
0m 5m 10m 15m 20m 25m

0	PRELIMINARY REVIEW	APR 22 2016
revisions		date

project / projet
PORT ROYAL
NATIONAL HISTORIC SITE
ASSESSMENT
ANNAPOLIS COUNTY, NS

drawing / dessin
PUMP HOUSE
SITE PLAN

designed DJP / conçu
date APRIL, 2016
drawn WAC / dessiné
date APRIL, 2016
approved / approuvé
date
Tender / Soumission
PWGSC Project Manager / Administrateur de projets TPSGC
project number / no. du projet
drawing no. / no. du dessin
C2

PWGSC A1 (2004)
E-DRM/GDD-E:

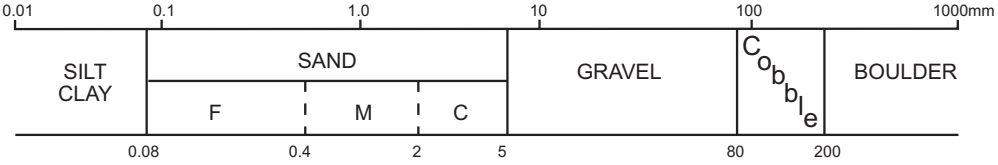
GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

FREDERICTON, MONCTON, BATHURST, GRAND FALLS, SAINT JOHN, NB

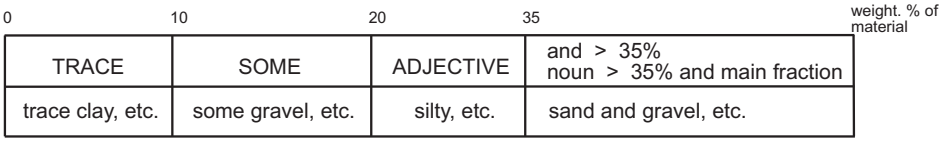
DESCRIPTIVE TERMS- BOREHOLE/TEST PIT LOG

SOILS

GRAIN SIZE



DESCRIPTIVE TERMINOLOGY



TRACE	SOME	ADJECTIVE	and > 35% noun > 35% and main fraction
trace clay, etc.	some gravel, etc.	silty, etc.	sand and gravel, etc.

COMPACTNESS gravels, sands, tills

N, RANGE	0 - 4	4 - 10	10 - 30	30 - 50	> 50
DENSITY	V. LOOSE	LOOSE	MEDIUM	DENSE	V. DENSE

CONSISTENCY silt, clay

S, KPa	< 12.5	12.5 - 25	25 - 50	50 - 100	100 - 200
CONSISTENCY	V. SOFT	SOFT	MEDIUM	STIFF	V. STIFF

ROCK

RQD	OVERALL QUALITY	FRACTURE SPACING
0 - 25	VERY POOR	VERY CLOSE 20 - 60 mm
25 - 50	POOR	CLOSE 60 - 200 mm
50 - 75	FAIR	MODERATE 200 - 600 mm
75 - 90	GOOD	WIDE 600 - 2000 mm
90 - 100	EXCELLENT	VERY WIDE 2 - 6 m

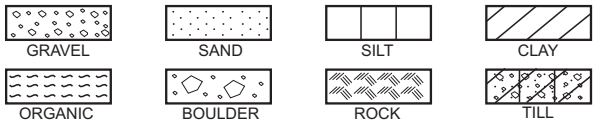
COMP. STR. MPa	1 - 5	5 - 25	25 - 50	50 - 100	100 - 250
DESCRIPTION	V. WEAK	WEAK	MODERATE	STRONG	V. STRONG

SAMPLE TYPES (location to scale on log)

S	SPLIT TUBE	G	SHOVEL
T	SHELBY TUBE	H	CARVED BLOCK
P	PISTON	K	SLOTTED
F	AUGER	V	IN SITU VANE
W	WASH	NR	NO RECOVERY

ROCK CORES A(30mm); B(41mm); N(54mm)

LOG SYMBOLS



WELL SYMBOLS

N - standard penetration test; blows by 475 J drop hammer to advance Std. 50mm O.D. split tube sampler 0.3m

RQD - percent of core consisting of hard, sound pieces in excess of 100mm long (excluding machine breaks)

RECOVERY - sample recovery expressed as percent or length

S - shear strength , kPa; vane ⊕ ; penetrometer ■; unconfined ○; Uc unconfined compressive strength

Sr - shear strength, remoulded; vane ⊗ ; penetrometer □

Dd - dry density; t/m^3

W - natural moisture content, percent ✳

PL - plastic limit, percent ⊢

LL - liquid limit, percent ⊣

ND - non detect, total petroleum hydrocarbons (TPH) not detected in soil

Groundwater Level ▼ ; Seepage ▽

Revised Oct, 2009

BHDESCRM-2009.CDR

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 408817	BOREHOLE MW1
Project	Port Royal National Historic Site Assessment	Date Drilled 2015/12/15	Page 1 of 1
Location	Annapolis County, NS		
Ground Level, m 6.11	Datum: Geodetic	Logged By WAC	

Undrained Shear Strength - kPa: 0, 25, 50, 75, 100
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits (w_P, w, w_L)
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m
0 10 20 30 40 50 60 70 80 90 100

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	S1	S	7	406	0.10	TOPSOIL 6.01
						Silty SAND and GRAVEL, some Clay, some Boulders (TILL)
1	S2	S	8	406		
	S3	S	14	356		
2	S4	S	33	356		
						-Rock at tip
3	S5	S	64	533		-Rock at tip
	S6	S	76	330		
4					4.57	1.54
						End of Hole at 4.57m in Silty SAND and GRAVEL, some Clay, some Boulders (TILL)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 408817	BOREHOLE MW2
Project	Port Royal National Historic Site Assessment	Date Drilled 2015/12/15	Page 1 of 1
Location	Annapolis County, NS		
Ground Level, m 8.51	Datum: Geodetic	Logged By WAC	

Undrained Shear Strength - kPa
0 25 50 75 100
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits w_P w w_L
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m
0 10 20 30 40 50 60 70 80 90 100

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	S1	S	6	356	0.10	TOPSOIL 8.41
						Silty SAND and GRAVEL, some Clay (TILL)
	S2	S	7	305	0.90	7.61
1						Coarse SAND
					1.22	7.29
	S3	S	57	533		Silty SAND and GRAVEL, some Clay, some Boulders (TILL)
2	S4	S	64	254		
3	S5	S	77	305		
4						
	S6	S	37	432		
5	S7	S	37	305		
6	S8	S	72	305		
					6.71	1.80
	S9	S	10	152		Wet, Silty SAND and GRAVEL
7					7.62	0.89
						End of Hole at 7.62m in Wet, Silty SAND and GRAVEL

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 408817	BOREHOLE MW3
Project	Port Royal National Historic Site Assessment	Date Drilled 2015/12/15	Page 1 of 1
Location	Annapolis County, NS		
Ground Level, m 10.20	Datum: Geodetic	Logged By WAC	

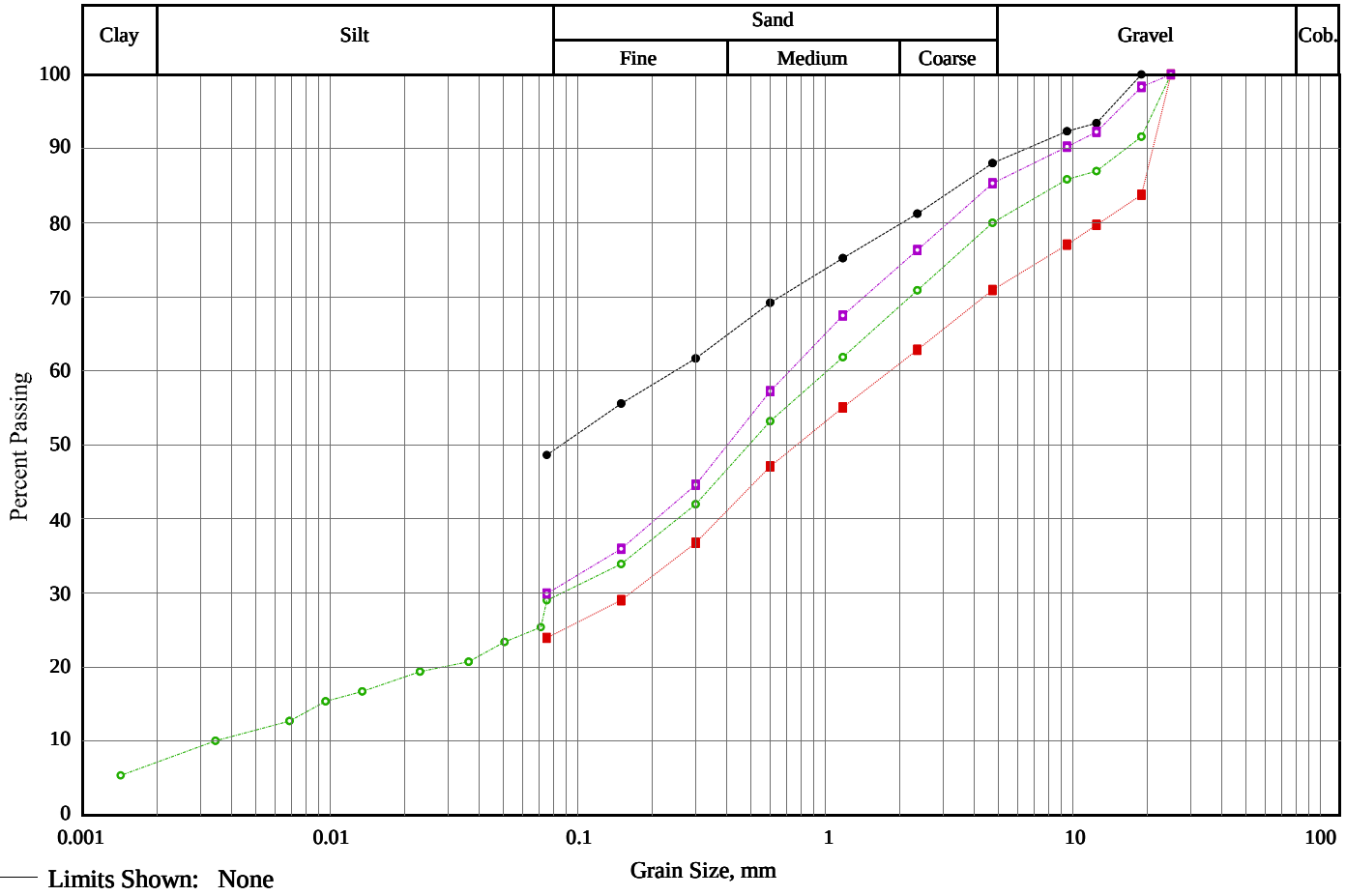
Undrained Shear Strength - kPa
0 25 50 75 100
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits w_P w w_L
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m
0 10 20 30 40 50 60 70 80 90 100

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION	
0	S1	S	4	102		0.10 TOPSOIL	10.10
						Silty SAND and GRAVEL, some Clay (TILL)	
1	S2	S	25	381			
	S3	S	20	305			
2	S4	S	26	610		2.44	7.76
						2.54 Coarse SAND, some Gravel, Wet	7.66
						2.74 Wet, Silty SAND and GRAVEL (TILL)	7.46
3	S5	S	67	610		Silty SAND and GRAVEL, some Clay, some Boulders (TILL)	
	S6	S	53	610			
4							
	S7	S	50	305			
5	S8	S	53	610		5.18	5.02
						Silty SAND, some Gravel	
						5.79	4.41
6						Silty SAND and GRAVEL, some Clay, some Boulders (TILL)	
	S9	S	44	356			
	S10	S	90	305			
7						7.62	2.58
						End of Hole at 7.62m in Silty SAND and GRAVEL, some Clay, some Boulders (TILL)	

GEMTEC
Consulting Engineers and Scientists

Client:	Parks Canada Agency
Project:	Port Royal National Historic Site Assessment, Annapolis
Project #:	0408817

Soils Grading Chart



Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
●—●—	MW1	1	2	0.61-1.22m	12.0	39.4	48.6		16/01/27
■—■—	MW1	1	4	2.14-2.75m	29.1	47.0	23.9		16/01/27
○—○—	MW2	2	6	4.57-5.18m	20.0	51.0	21.8	7.1	16/01/28
□—□—	MW2	2	2	0.61-1.22m	14.7	55.4	29.9		16/01/27

Line Symbol	Sample Description	AASHTO	D_{10}	D_{15}	D_{50}	D_{85}	% 5-75µm
●—●—	Silt and sand , some gravel	A-4 to A-7	---	---	0.09	3.48	---
■—■—	Gravelly silty sand	A-1-b	---	---	0.77	19.41	---
○—○—	Gravelly silty sand , trace clay	A-2-4	0.00	0.01	0.49	8.61	17.5
□—□—	Silty sand , some gravel	A-2-4	---	---	0.40	4.64	---

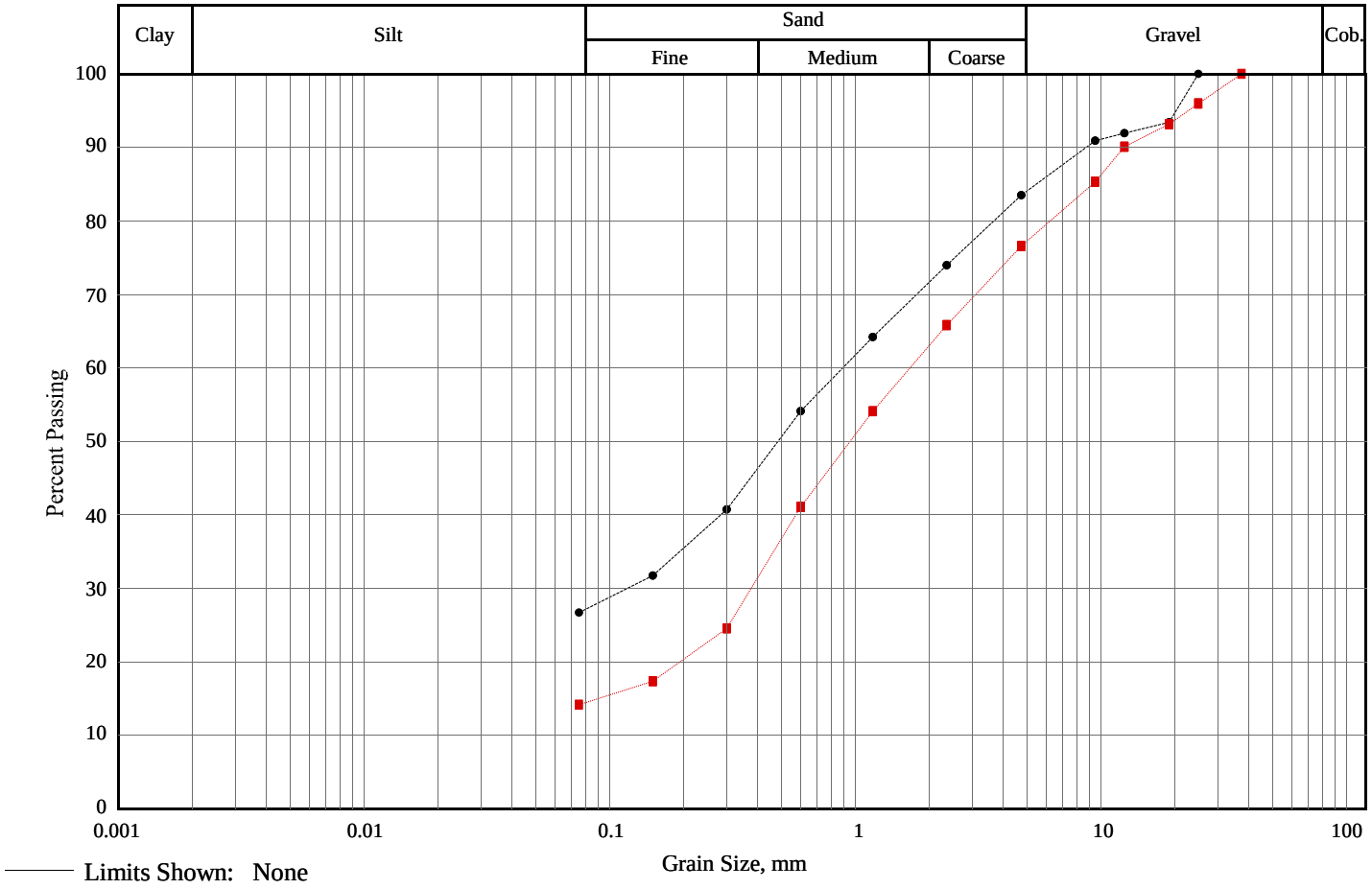
GEMTEC
Consulting Engineers and Scientists

Client: Parks Canada Agency

Project: Port Royal National Historic Site Assessment, Annapolis

Project #: 0408817

Soils Grading Chart



Limits Shown: None

Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
●----	MW3	3	4b	2.44-2.75m	16.5	56.8	26.7		16/01/27
■----	MW3	3	8	7.62-8.23m	23.4	62.4	14.1		16/01/27

Line Symbol	Sample Description	AASHTO	D_{10}	D_{15}	D_{50}	D_{85}	% 5-75µm
●----	Silty sand , some gravel	A-2-4	---	---	0.49	5.47	---
■----	Gravelly sand , some silt	A-1-b	---	0.09	0.95	9.27	---

GEMTEC
Consulting Engineers and Scientists

Client	Parks Canada Agency
Project:	Port Royal National Historic Site Assessment, Annapolis
Project #:	0408817

Moisture Content and Density

Borehole:	1	Date/Time Sampled:	16/01/27 3:59:43 PM	Mass of Cont. + Wet Soil, g:	694.20
Depth:	0.61-1.22m	Date/Time Tested:	16/01/27 3:59:43 PM	Mass of Cont. + Dry Soil, g:	618.00
Sample:	2			Mass of Container, g:	104.50
Description:	MW1			Moisture Content, %:	14.84
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	
Borehole:	1	Date/Time Sampled:	16/01/27 3:59:43 PM	Mass of Cont. + Wet Soil, g:	1130.90
Depth:	2.14-2.75m	Date/Time Tested:	16/01/27 3:59:43 PM	Mass of Cont. + Dry Soil, g:	1052.60
Sample:	4			Mass of Container, g:	166.20
Description:	MW1			Moisture Content, %:	8.83
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	
Borehole:	2	Date/Time Sampled:	16/01/27 3:59:43 PM	Mass of Cont. + Wet Soil, g:	847.00
Depth:	0.61-1.22m	Date/Time Tested:	16/01/27 3:59:43 PM	Mass of Cont. + Dry Soil, g:	754.90
Sample:	2			Mass of Container, g:	163.30
Description:	MW2			Moisture Content, %:	15.57
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	

GEMTEC
Consulting Engineers and Scientists

Client	Parks Canada Agency
Project:	Port Royal National Historic Site Assessment, Annapolis
Project #:	0408817

Moisture Content and Density

Borehole:	3	Date/Time Sampled:	16/01/27 3:59:43 PM	Mass of Cont. + Wet Soil, g:	980.20
Depth:	2.44-2.75m	Date/Time Tested:	16/01/27 3:59:43 PM	Mass of Cont. + Dry Soil, g:	890.30
Sample:	4b			Mass of Container, g:	173.00
Description:	MW3			Moisture Content, %:	12.53
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	

Borehole:	3	Date/Time Sampled:	16/01/27 3:59:43 PM	Mass of Cont. + Wet Soil, g:	1779.10
Depth:	7.62-8.23m	Date/Time Tested:	16/01/27 3:59:43 PM	Mass of Cont. + Dry Soil, g:	1630.90
Sample:	8			Mass of Container, g:	166.20
Description:	MW3			Moisture Content, %:	10.12
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	

Appendix B
Pump Specifications

3" & 4" SUBMERSIBLE SEWAGE PUMPS

1.01 GENERAL

A. Furnish all labor, materials, equipment and incidentals required to provide _____ (qty.) solids handling submersible centrifugal sewage pumps(s) as specified herein.

2.01 OPERATING CONDITIONS

A. Each pump shall be rated _____ HP, _____ volts, _____ phase, and _____ hertz, 1750 RPM. The unit shall produce _____ U.S. GPM at _____ feet TDH. The S3S shall be capable of handling a 2-1/2" spherical solid and the S4S a 3" spherical solid. The pump shall be non-overloading throughout the entire range of operation without employing service factor. The pump shall reserve a minimum service factor of 1.20. The performance curve submitted for approval shall state in addition to head and capacity performance, the pump efficiency and solid handling capability.

3.01 CONSTRUCTION

A. Each pump shall be of the sealed submersible type, Models S3S, S4S, SB3S, SB4S, S3SD, S4SD, SB3SD, and SB4SD as manufactured by Hydromatic Pump. The pump volute, motor and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30. The pump discharge shall be fitted with a 3" standard ASA 125 lb. flange, faced and drilled for the S3S models, and a 4" standard ASA 125 lb. flange, faced and drilled for the S4S models. All external mating parts shall be machined and BUNA N rubber O-ring sealed on a beveled edge. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

3.02 ELECTRICAL POWER CORD

A. Electrical power cord shall be STW-A, water resistant 600V, 60°C, UL and CSA approved and applied dependent on amp draw for size.

B. The pump shall be double protected with compression fitting and an epoxy potted area at the power cord entry to the pump.

C. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to the bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be filled with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.

D. The power cord assembly shall then be connected to the motor leads with insulated butt connectors rather than a terminal board that allows for possible leaks.

E. The cord cap assembly where bolted to the motor housing shall be sealed with a BUNA N rubber O-ring on a beveled edge to assure proper sealing.

3.03 MOTOR

A. The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation (155°C or 311°F) and dielectric oil-filled motor, NEMA B design. Single-phase motors shall have thermal type overload protection with automatic reset and be capacitor start with capacitor located in the control panel. Three phase motors shall use magnetic starters with overload relays located in the control panel for further protection. Because air-filled motors do not dissipate heat as efficiently as oil-filled motors, air-filled designs shall not be acceptable.

B. Stators shall be securely held in place with threaded fasteners so they may be easily removed in the field without the use of heat or a press. Stators held by a heat shrink fit shall not be acceptable. Stators must be capable of being repaired or rewound by a local motor service station. Units that require service only by the factory shall not be acceptable. No special tools shall be required for pump and motor disassembly.

3.04 BEARINGS AND SHAFT

A. An upper radial bearing and lower thrust bearing shall be required. Both the upper radial bearing and the lower thrust bearing shall be heavy-duty single row ball bearings that are permanently lubricated by the dielectric oil that fills the motor housing. Double row, sealed grease packed bearings shall not be acceptable. Bearings that require lubrication according to a prescribed schedule shall not be acceptable. Bearings shall be locally available.

B. The shaft shall be machined from a solid 400 stainless steel and be a design that is of larger diameter with minimum overhand to reduce shaft deflection and prolong bearing life.

3.05 SEALS

A. The S3S, S4S, SB3S, and SB4S shall have a mechanical single seal, John Crane Type 21. The S3SD, S4SD, SB3SD, and SB4SD shall have a mechanical dual seal, John Crane Type 21. The seal shall be used with the rotating seal face being carbon and the stationary seal face to be ceramic. The seal shall be replaceable without disassembly of the seal plate and without the use of special tools. Pump-out vanes shall be present on the backside of the impeller to keep contaminants out of the seal area. Units that require the use of tungsten-carbide seals or foreign manufactured seals shall not be acceptable. Seals shall be locally available.

3.06 IMPELLER

A. Impeller shall be of the two-vane, semi-enclosed design and have pump-out vanes on the backside of the impeller to prevent grit and other materials from collecting in the seal area. Single vane design impellers that cannot be easily trimmed and that do not maintain balance with wear, causing shaft defections and reducing seal and bearing life, are not acceptable. Impeller shall not require coating. Because most impeller coatings do not remain beyond the very early life of the impeller, efficiency and other performance data submitted shall be based on performance with an uncoated impeller. Attempts to improve efficiency by coating impeller shall not be acceptable.

B. Impellers shall be dynamically balanced. The tolerance values shall be as listed below according to the International Standard Organization grade 6.3 for rotors in rigid frames.

RPM	Tolerance
1750	.02 in. – oz./lb. of impeller weight

C. The impeller shall be slip fit to the shaft and key driven. A 400 series stainless steel washer and impeller bolt shall be used to fasten the impeller to the shaft. Threaded shafts for attachment of the impeller shall not be acceptable.

3.07 CASING

A. The casing shall be of the end suction volute type having sufficient strength and thickness to withstand all stress and strain from service at full operating pressure and load. The casing shall be of the centerline discharge type equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment. The design shall be such that the pumps will be automatically connected to the discharge piping when lowered into position with the guide rails. The casing shall be accurately machined and bored for register fits with the suction and casing covers.

3.08 PAINTING

A. The pump shall be painted after assembly and testing with a dark green water reducible air-dry enamel. The paint shall be applied in one coat covering all exterior surfaces.

3.09 SERVICEABILITY

A. The pump shall be painted after assembly and testing with a dark green water reducible air-dry enamel. The paint shall be applied in one coat covering all exterior surfaces. The pump shall be air-dried after testing and before painting.

4.01 TESTING

A. Commercial testing shall be required and include the following:

1. The pump shall be visually inspected to confirm that it is built in accordance with the specifications as to HP, voltage, phase and hertz.
2. The motor housing chambers shall be meggered for infinity to test for moisture content and insulation defects.
3. Pumps shall be allowed to run dry to check for proper rotation.
4. Discharge piping shall be attached, the pump submerged in water, and amp readings taken in windings shall be checked with a bridge to determine if an unbalanced resistance exists. If so, the stator shall be replaced.
5. The pump shall be removed from the water, meggered again, dried and the motor housing filled with dielectric oil.

PENTAIR

Customer :
Project name :

Pump Performance Datasheet

Encompass 2.0 - 16.2.1.0

Item number	: Default	Size	: Hydromatic - ~~S6~~S3SD
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_O_AH_00001_B_4 Rev 2012-03-23
Quote number	:	Date last saved	: 20 May 2016 6:07 AM

Operating Conditions

Flow, rated	: 100.0 USgpm
Differential head / pressure, rated (requested)	: 15.00 ft
Differential head / pressure, rated (actual)	: 15.83 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1750 rpm
Impeller diameter, rated	: 4.75 in
Impeller diameter, maximum	: 6.50 in
Impeller diameter, minimum	: 4.75 in
Efficiency	: 44.78 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: N/A Metric units
Minimum Continuous Stable Flow	: 36.43 USgpm
Head, maximum, rated diameter	: 23.80 ft
Head rise to shutoff	: 58.65 %
Flow, best eff. point	: 131.3 USgpm
Flow ratio, rated / BEP	: 76.17 %
Diameter ratio (rated / max)	: 75.00 %
Head ratio (rated dia / max dia)	: 37.80 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

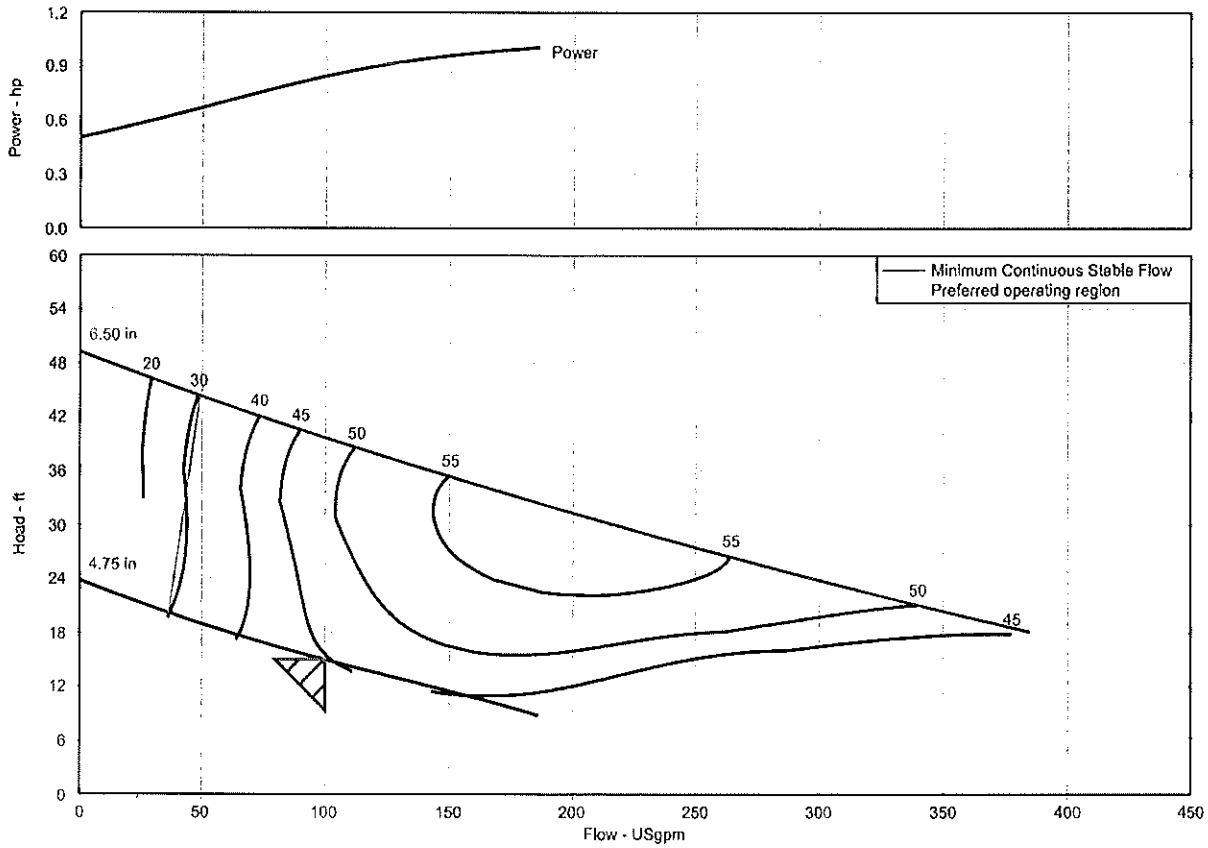
Material selected	: Standard

Pressure Data

Maximum working pressure	: 10.30 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 0.38 hp
Power, rated	: 0.85 hp
Power, maximum, rated diameter	: 1.01 hp
Minimum recommended motor rating	: 1.50 hp / 1.12 kW



DETAILS

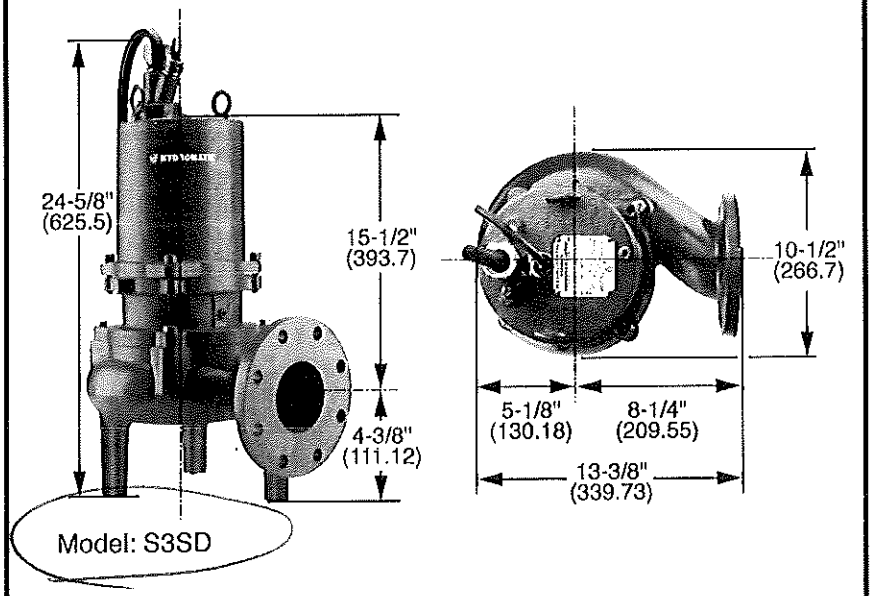
Pumps Characteristics

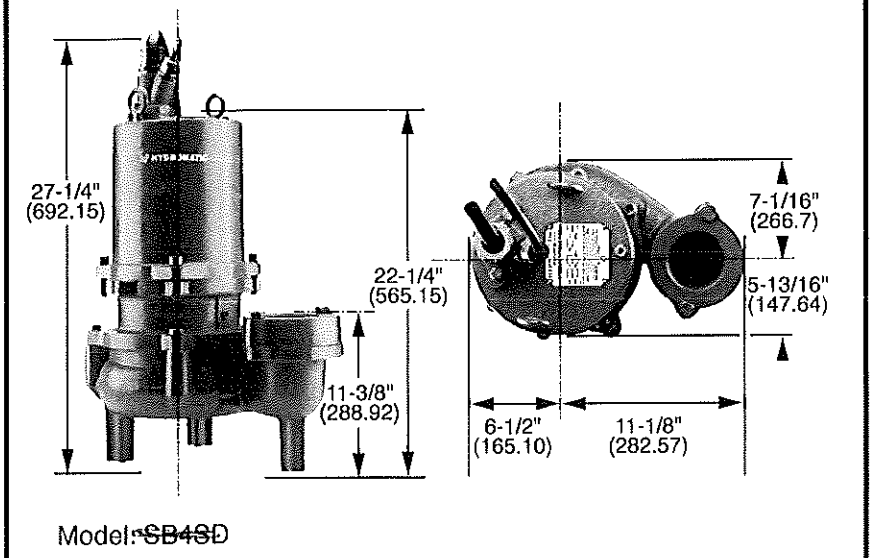
Pump/Motor Unit	Submersible-Sewage Ejector	
Phase	1 Ø	3 Ø
Voltage	208/230	208/230/460/575
Horsepower	1, 1.5, 2, 3 & 5	1.5, 2, 3, 5 & 7.5
Motor Type	Oil Cooled Induction	
	1 Ø = Capacitor Start	
R.P.M.	1750/1150	
Temp.	140° F Ambient	
Operation	Intermediate	
Hertz	60 Hz	
Thermal Overload	Bi-Metallic	
Temperature	Max. Water 140° F	
NEMA Design	Type B (3 Ø)	Type L (1 Ø)
Insulation	Class F	
Discharge Size	3" Flanged/4" Flanged	
NPT or Flanged	3"/4"	
Unit Weight	180 lbs.	
Power Cord	Type STW-A Water Resistant	
	600 V, 60° C CSA Approved 35' Ft. Std.	

Materials of Constuction

Motor Housing	Cast Iron ASTM-48, Class 30
Pump Casing	Cast Iron ASTM-48, Class 30
Coolant/Lubricant	Dielectric Oil
Shaft	Stainless Steel
Mechanical Shaft Seal	Seal Faces: Carbon/Ceramic Seal Body: Stainless Steel Spring: Stainless Steel Bellows: Buna-N
Impeller	Two-Vane Semi-Open Cast Iron
Upper Bearing	Single Row Ball Bearing
Lower Bearing	Single Row Ball Bearing
Fasteners	Stainless Steel

Dimensional Data





All dimensions in inches. Metric for international use. Component dimensions may vary ± 1/8 inch. Dimensional data not for construction purpose unless certified. Dimensions and weights are approximate. On/Off level adjustable. We reserve the right to make revisions to our product (s) and the product (s) specifications without notice.

HYDROMATIC
ENGINEERED PRODUCTS

MODEL: S3SD/SB3SD — Standard Dual Seal Sewage Ejector Pumps

Physical Data:

DISCHARGE SIZE	3"
IMPELLER TYPE	BALANCED, SEMI OPEN, 2 VANE
CABLE LENGTH	15' STANDARD 30' OPTIONAL
PAINT	PAINTED AFTER ASSEMBLY. DARK GREEN, WATER REDUCIBLE ENAMEL, ONE COAT, AIR DRIED.

Liquid Handling:

SOLIDS SIZE	2-1/2"
MAXIMUM LIQUID	140°F
ACCEPTABLE PH RANGE	6 - 9
SPECIFIC GRAVITY	0.9 - 1.1
VISCOSITY	28 - 35 SSU

Temperature:

MAXIMUM STATOR	311°F
OIL FLASH POINT	390°F
HEAT SENSOR Open: Closed:	257°F MAX./239°F MIN. 194°F MAX./119°F MIN.

Technical Data:

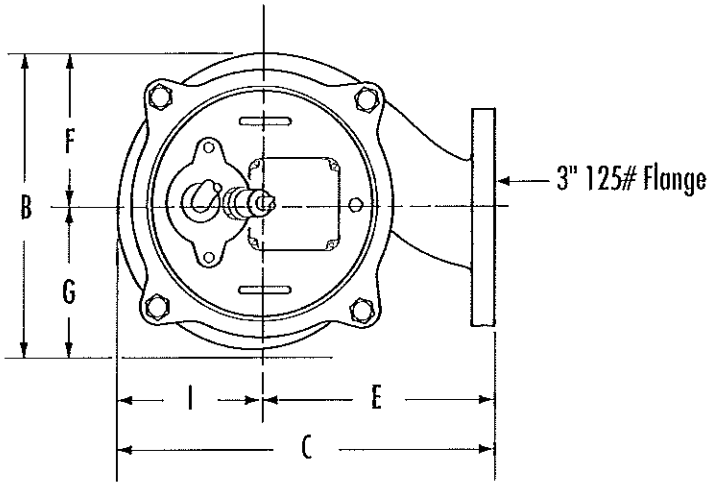
POWER CORD TYPE		STW-A WATER RESISTANT 600V, 60°C			
	MOTOR HOUSING	CAST IRON	ASTM	A-48	CLASS 30
MATERIALS OF CONSTRUCTION	CASING	CAST IRON	ASTM	A-48	CLASS 30
	IMPELLER	DUCTILE IRON	ASTM	536	
	MOTOR SHAFT	400 STAINLESS STEEL			
	HARDWARE	300 SERIES STAINLESS STEEL			
	"O" RINGS	BUNA N			
MECHANICAL SEALS Standard:		CARBON/CERAMIC/BUNA-n, TYPE 21			
UPPER BEARING		(RADIAL) SINGLE ROW — BALL			
LOWER BEARING		(THRUST) SINGLE ROW — BALL			

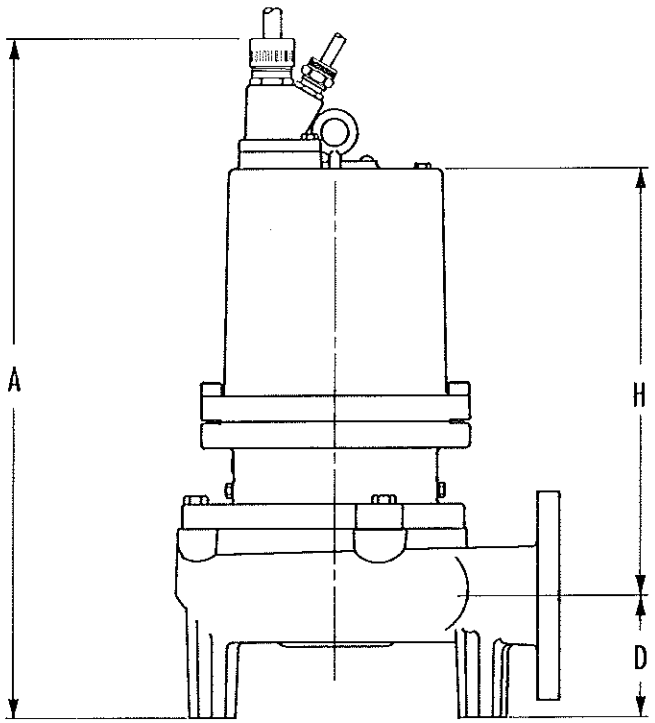
MODEL: S3SD/SB3SD & S4SD/SB4SD —Sewage Pump

R.P.M.	1750			
MOTOR TYPE	ENCLOSED, OIL COOLED INDUCTION, VFD SUITABLE			
MOTOR DESIGN NEMA TYPE	B (3ø) L (1ø)			
GENERAL INSULATION CLASS	F			
STATOR WINDING CLASS	F			
MAXIMUM STATOR TEMPERATURE	311°F			
MOTOR PROTECTION	BI-METALLIC, TEMPERATURE SENSITIVE DISC, SIZED TO OPEN AT 120°C AND AUTOMATICALLY RESET @ 30–35°C DIFFERENTIAL, ONE IN SINGLE PHASE, TWO IN THREE PHASE			
ELECTRICAL RATINGS	HEAT SENSOR	24VDC 5AMPS	115VAC 5AMPS	230VAC 5AMPS
	SEAL FAIL	300VAC 5mA		
VOLTAGE TOLERANCE	±10%			

HP	VOLTAGE	PHASE	NEC CODE	SF	FULL LOAD AMPS	RUN KW	START AMPS	START KVA	RUN KVA	MTR. EFF. 100% FL	MTR. EFF. 75% FL	MTR. EFF. 50% FL	PWR. FACT. 100% FL	PWR. FACT. 75% FL	PWR. FACT. 50% FL
1.5	230	1	L	1.2	12.8	1.9	62	14.3	2.5	.60	.56	.48	.75	.68	.60
1.5	200	3	P	1.2	7.8	1.6	46	15.9	2.3	.70	.65	.56	.70	.62	.52
	230				6.8	1.6	40	15.9	2.3						
	460				3.4	1.6	20	15.9	2.3						
	575				2.7	1.6	16	15.9	2.3						
2.0	230	1	L	1.2	12.8	1.9	62	14.3	2.5	.60	.56	.48	.75	.68	.60
2.0	200	3	L	1.2	7.8	1.6	46	15.9	2.3	.70	.65	.56	.70	.62	.52
	230				6.8	1.6	40	15.9	2.3						
	460				3.4	1.6	20	15.9	2.3						
	575				2.7	1.6	16	15.9	2.3						
3.0	230	1	J	1.2	17.1	3.9	62	14.3	4.6	.58	.60	.57	.84	.81	.70
3.0	200	3	J	1.2	10.9	3.1	64.5	22.3	3.8	.72	.70	.64	.82	.80	.72
	230				9.5	3.1	56	22.3	3.8						
	460				4.8	3.1	28	22.3	3.8						
	575				3.8	3.1	22.5	22.3	3.8						
5.0	230	1	G	1.2	29.5	5.7	125	28.8	6.8	.66	.65	.60	.84	.77	.64
5.0	200	3	L	1.2	17.6	4.8	108	37.4	6.1	.79	.77	.72	.78	.73	.62
	230				15.3	4.8	94	37.4	6.1						
	460				7.6	4.8	47	37.4	6.1						
	575				6.1	4.8	37.6	37.4	6.1						
7.5	200	3	K	1.2	29.0	7.2	194	67.0	10.1	.78	.76	.71	.72	.66	.56
	230				25.2	7.2	168	67.0	10.1						
	460				12.6	7.2	84	67.0	10.1						
	575				10.1	7.2	67.2	67.0	10.1						

Dimensional Data S3SD





	A	B	C	D	E	F	G	H	I
S3SD	24-5/8	10-1/2	13-3/8	4-3/8	8-1/4	5-5/8	4-7/8	15-3/4	5-1/8

ALL DIMENSIONS IN INCHES
NOTE: CASTING DIMENSIONS MAY VARY ± 1/8"

1. GENERAL

.1 Control at the Station shall be achieved through the use of a relay based pump controller capable of achieving the following real time tasks:

1. Control pump station operation
2. Alarm detection and annunciation
3. Pump alternation
4. Pump lockouts
5. Safety interlocking
6. Automatic transfer to standby (lag) in the event of lead pump failure
7. Interfacing of pump monitoring sensors to the relay logic
8. Interfacing of Hand-Off-Auto selector switches to the relay logic
9. Interfacing of the level controls to the relay logic

2. SYSTEM OPERATION AND CONTROL

.1 The pumping station consists of two submersible Hydromatic constant speed pumps. The pumps are sized so that any one pump can facilitate peak flow.

.2 The two pumps shall be automatically alternated by the controller who will assign lead and lag duty on a cycle by cycle basis so as to equalize pump usage.

.3 In the event of a failure of the lead pump or excessive inflows into the station, the system will be setup such that the standby (lag) pump will be brought on line to assist in the operation.

.4 Under normal operation, the lead and lag duty pumps shall stop and start in response to the output from the float switches. The floats will be placed in the tank in the following manner from lowest to highest:

.1 – Stop Float – Stops pumps
.2 – Start Float – Starts the lead pump as selected by the controller
.3 – Start Lag Float/High Level Alarm – Starts the 2nd pump to assist in pumping down the wet well and initiates the high level alarm and dry contacts

.5 Interlocks required for this station are as follows:
.1 Temperature sensor fault – Lockout pump – Transfer to Lag- Manual reset
.2 Pump overload – Lockout pump – Transfer to Lag- Manual reset
.3 Moisture sensor fault – alarm only – Manual reset
.4 Voltage/Phase fault-alarm and cutout- Automatic reset after delay

.6 All the alarms at the station are to be electrically locked in and will require manual reset. The following alarms will be annunciated at the pump station:
.1 High level
.2 The EHSM will display the following faults: Overload Fault, High temperature fault, seal leak fault. Each pump is connected to an EHSM.
.3 Voltage/Phase fault

3. DUPLEX PUMP CONTROLLER

.1 The duplex pump controller is to be housed in an industrial quality heavy gauge, stainless steel or fiberglass panel meeting EEMAC 4x requirements. The panel is to include fully hinged aluminum inner door capable of opening ninety (90) degrees for full access to all backplate mounted devices. The panel is to come complete with a padlock hasp and quarter turn latches.

.2 The control panel is to house all necessary equipment to operate the pumps, including power supply, main disconnect, intrinsically safe level controls, and power and control feeds to and from each pump.

.3 The panel is to be supplied by the pump supplier Thomas Industrial Sales, who shall be responsible for co-ordination of all devices to ensure the system is complete. Contact Mr. Bernie Banks at 1-506-453-1188 for price and delivery

.4 That all components are CSA approved and that the panel carries a CSA approval. All electrical equipment, wiring, grounding, and testing for this project must meet the Canadian Electrical Safety Code including all appendices and bulletins issued by the Local Hydro Inspectors Department applicable to this project.

.5 The panel is assembled in Canada from components made or stocked in Canada.

.6 The panel is manufactured to control two 2HP, 575Volts/3 Phase/60 Hz pumps.

.7 Ensure the following:

.1 EEMAC 4x enclosure made of stainless steel or fiberglass, with formed hinge front door to open over one hundred and thirty five (135) degrees for inside access. The panel is to come complete with a fully hinged aluminum inner door, padlock hasp and quarter turn latches. Painted 4x steel will not be accepted.

.2 Provide a door interlocked main disconnect to act as an isolating switch for the panel. The main disconnect must include provisions for padlocking in the OFF position. Eaton R9 Series

.3 Provide manual motor starters for each pump which are sized for the FLA of the pumps. Schneider GV2P or GV3P series or approved equal.

.4 Provide IEC contactors rated for the FLA of the pumps. Schneider LC1D series or approved equal

.5 The control relays will be a minimum of four-pole socket style with visual flag, and 120V coil. Omron MY series with sockets or approved equal

.6 Provide a solid state relay for automatic alternation of the pumps on a cycle by cycle basis. Diversified Electronics ARA-120-ABA

.7 Provide a common fault dry contact as well as the following individual dry contacts:
-Pump No.1 Fault
-Pump No.2 Fault
-High Level Fault
-Voltage/Phase Fault

.8 Provide terminal blocks (tubular screw or screw type) for all field devices and pumps. Ensure a minimum of ten percent spare terminals are provided in the panel. Allen Bradley or Phoenix Contact

.9 Provide the following on the door:
- .1 Hand-Off-Automatic selector switch for each pump (illuminated)
- .2 Pump Run pilot light for each pump
- .3 Electronic Heat and Seal Module (EHSM) for each pump
- .4 High Level pilot light
- .5 Alarm Acknowledge pushbutton
- .6 Alarm Reset pushbutton
- .7 Alarm/Lamp pushbutton
- .8 Lamicoid nameplate for all door mounted items.

.10 Mount the following on top of the panel:
- .1 One red flashing alarm globe.

Ensure that the mounting is watertight so as to prevent any moisture from entering the enclosure.

.11 Provide industrial grade operators and pilot lights. Allen Bradley 800F or equal

.12 Provide an anti-condensation strip heater with a thermostat and cage.

.13 Provide a voltage monitor relay, complete with adjustable time delay on cutout and restart. The relay will provide instant cutout on any phase fault and time delay on over and under voltage conditions. Cutler Hammer or approved equal.

.14 Provide a fused surge suppressor on the incoming power. Intermatic or equal

.8 The following wiring practices are to be followed:
- .1 Control wire not less than 16 AWG stranded type TEW or equal.
- .2 Power Wire not less than 10 AWG stranded type TEW or equal.
- .3 Numbered at each end of the wire with slip on marker to correspond to the schematic
- .4 Adequately supported and neatly run wiring bundles
- .5 Incorporate the use of wiring duct on the backboard to provide ease of maintenance in the field.
- .6 "Hingecable" wiring between backplate and door mounted components to cause minimum flexing, properly laced and secured.

.9 The supplier to provide one day start-up at site and four operations and maintenance manuals for this system.

The manuals are to contain the following:
- a) As built set of panel schematics including layouts and terminal block connections
- b) Bill of material
- c) Information sheets on all materials used in the panel.

METAL-TO-METAL — GUIDE RAIL STATION

1.01 GENERAL

A. Contractor shall furnish all labor, materials, equipment and incidentals required to provide a complete pumping system as specified herein.

B. The MTM Rail System shall include _____ (Qty.) submersible non-clog sewage pump(s), discharge base elbow, sealing flange with rail guide, upper guide bracket, lifting chain or cable, access frame and hatch cover, float mounting bracket, control equipment, guide rails (2" galvanized or stainless steel pipe) and discharge piping.

2.01 DISCHARGE BASE ELBOW

A. A discharge base elbow, designed to mount directly on the sump floor, shall be supplied for each pump. It shall have a standard 125 pound flange faced and drilled on the outlet side, with a machined mating inlet connection. The design shall be such that the pump to discharge connection is made without the need for any nuts, bolts or gaskets. The base elbow shall also anchor and align the two, 2" guide rails.

2.02 SEALING FLANGE WITH RAIL GUIDE

A. A sealing flange/rail guide bracket shall be mounted on each pump discharge. It shall have a machined mating flange which matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by a simple linear downward motion of the pump culminating with the entire weight of the pumping unit supported entirely by the base elbow.

2.03 UPPER GUIDE BRACKET

A. The upper guide bracket shall align and support the two guide rails at the top of the sump. It shall bolt directly to the hatch frame and incorporate an expandable rubber grommet for secure rail installation.

2.04 LIFTING CHAIN/~~CABLE~~

A. Each pumping unit shall be provided with a lifting chain or cable, and be of sufficient length to extend from the pump to the top of the wet-well. The access frame shall provide a hook to attach the chain or cable when not in use. The lifting chain or cable shall be sized according to the pump weight.

2.05 ~~ACCESS FRAME AND DOOR~~

A. A separate access frame assembly shall be supplied with a separate hinged door for removal of each pump. The frame assembly and door shall be aluminum with 300 series stainless steel hinges and hardware. The aluminum door shall be raised tread plate to provide a skid-proof surface. As a safety precaution, each pump shall be provided with a separate door so as to limit access to the wet-well. The frame shall support the float mounting bracket. A recessed handle shall be provided with each door, as well as a safety latch to hold the door in an open position.

2.06 FLOAT MOUNTING BRACKET

A. A float mounting bracket shall be provided with strain reliefs that support and hold the level control cords. Continuous cords are to run from pump(s) and level controls to a control panel or junction box. No splices shall be made in the wiring. The bracket shall be fabricated from steel, coated for corrosion resistance, and attached to the access frame with 300 series stainless steel fasteners. A dielectric spacer should be installed when bolting to an aluminum access frame.

2.07 GUIDE RAIL

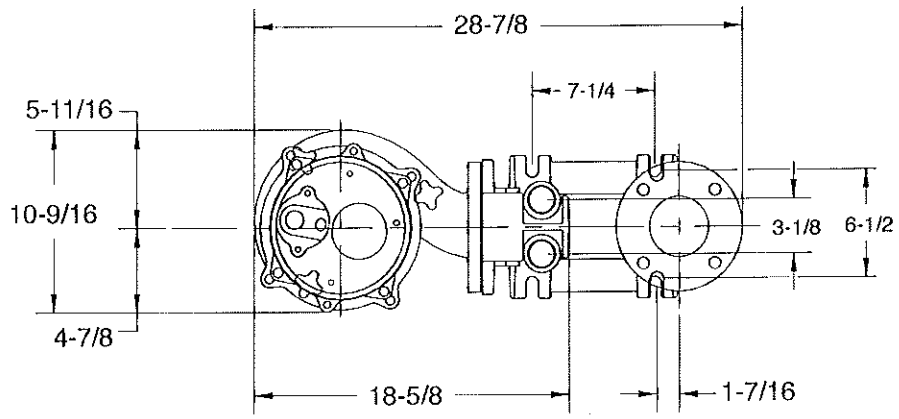
A. The dual rail guide design keeps the pump in proper alignment with the stationary discharge piping. These rails shall be 2" galvanized ~~or stainless steel~~ pipe which bolt directly to the base elbow and to the access frame at the top of the wet-well by an upper guide rail bracket.

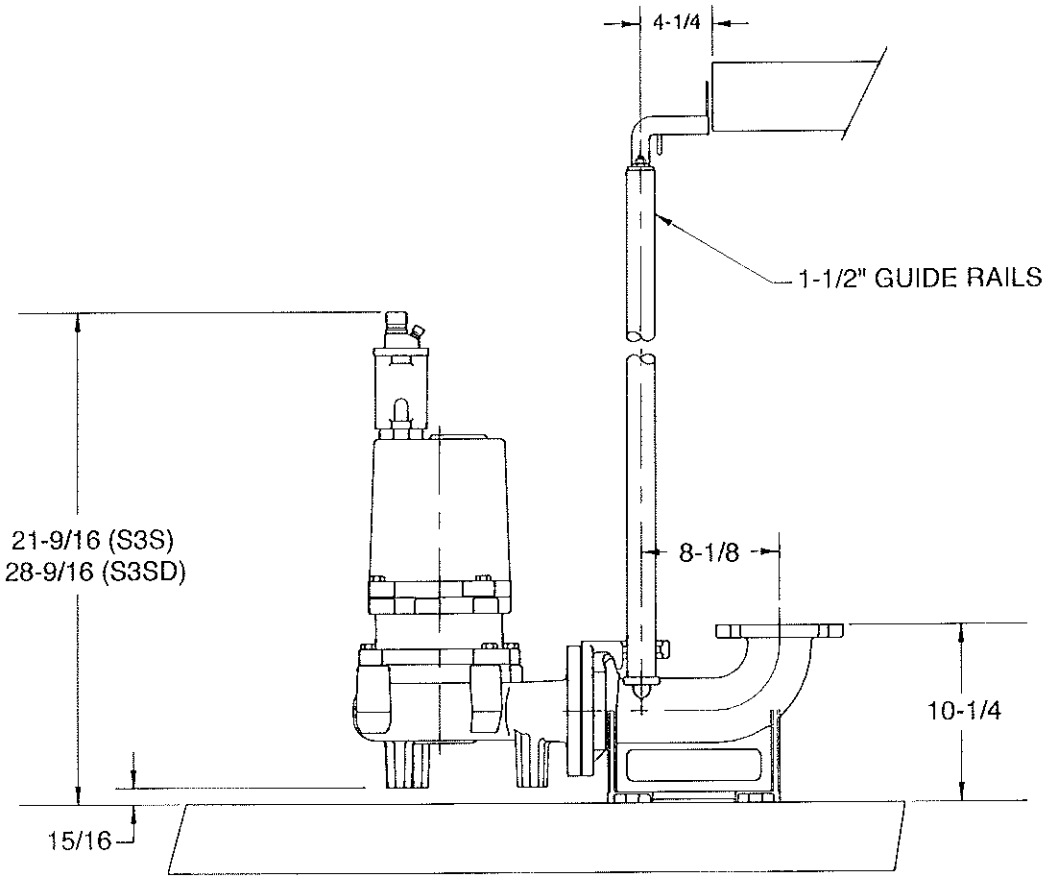
2.08 ~~PIPING~~

A. Piping shall include one (1) swing check valve with outside lever and spring, one (1) plug/gate valve and all the necessary gaskets, straight pipe, brackets, elbows, tees and fittings. All piping should be coated with coal tar epoxy or equal for corrosion resistance. Where piping passes through a wall, welding or sealing concrete shall be used to make a watertight joint.

B. **Note:** The Guide Rails and Discharge Piping and Valves are generally supplied by others. They are mentioned here and shown in the arrangement drawing to provide assistance and clarity.

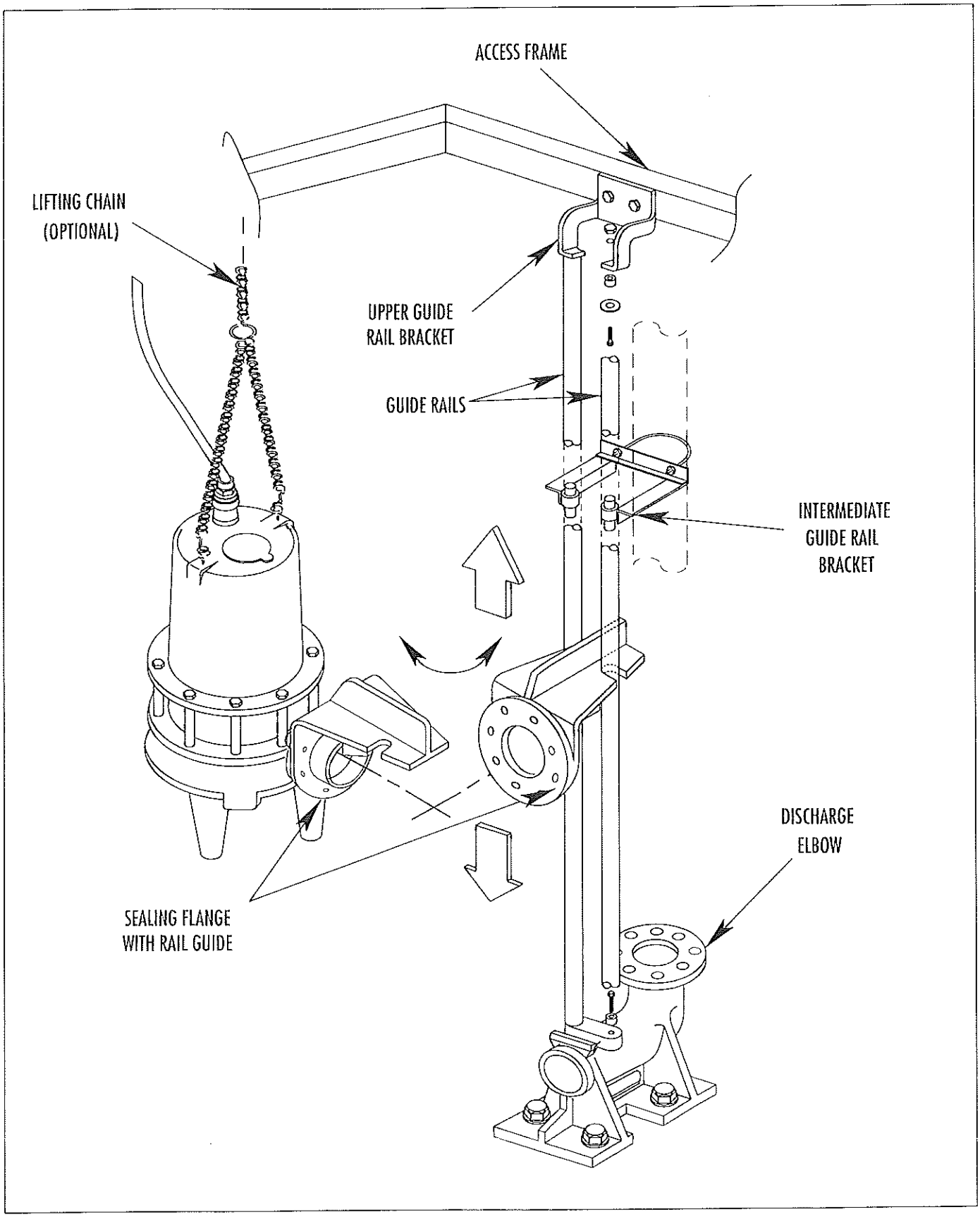
~~S3S~~/S3SD



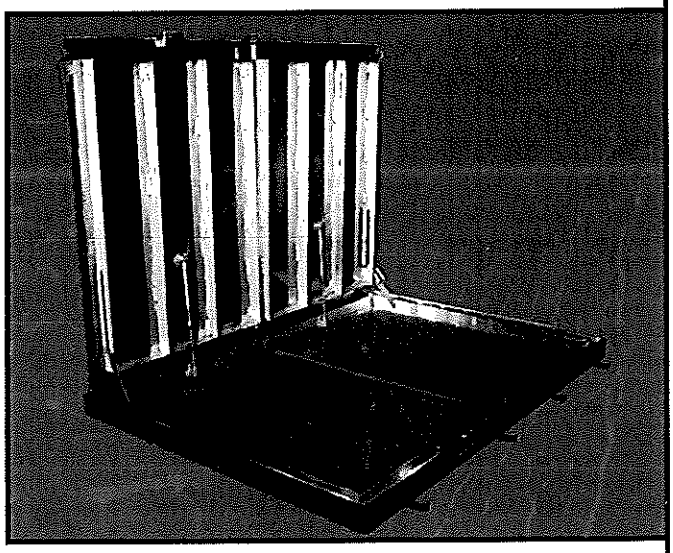


ALL DIMENSIONS IN INCHES

NOTE: CASTING DIMENSIONS MAY VARY ± 1/8"

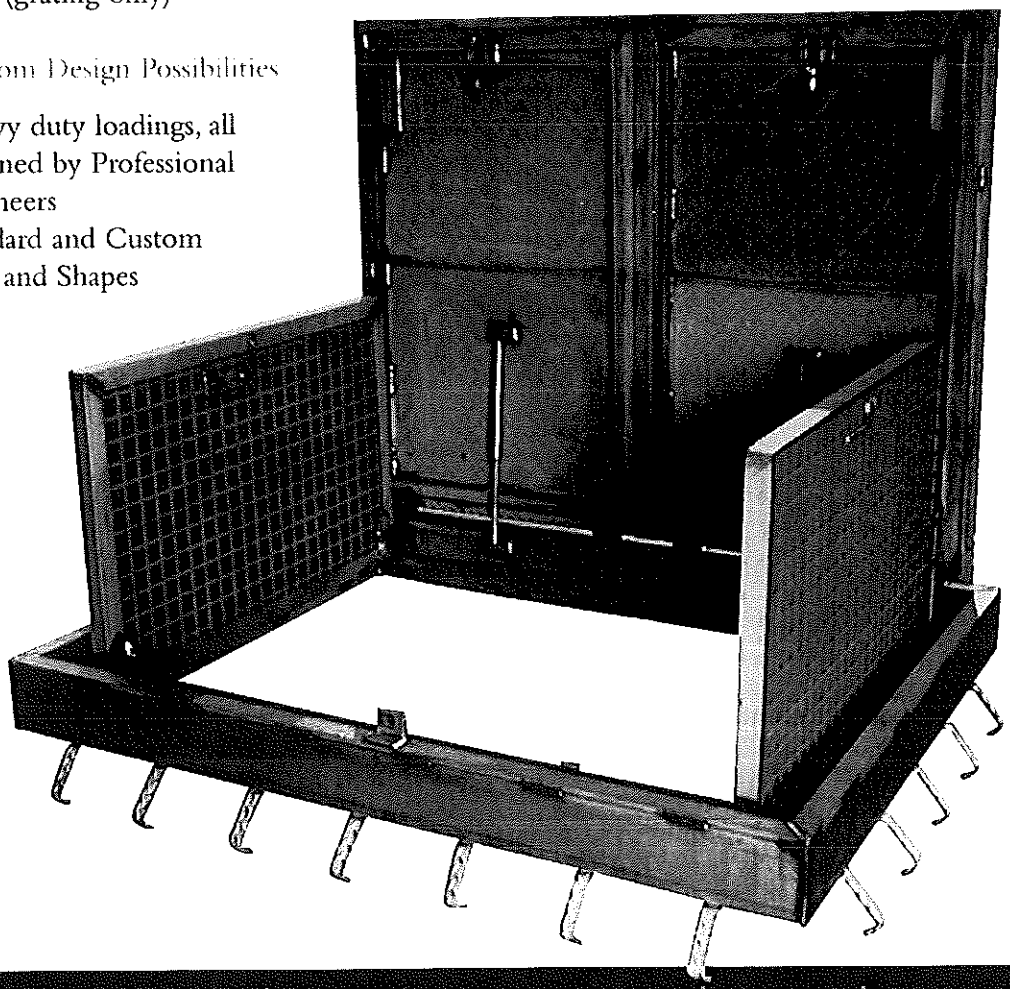


msu type MG hatches

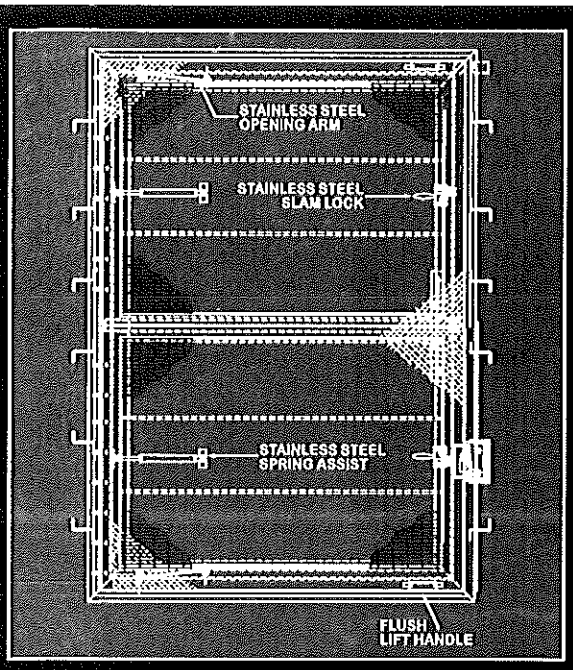


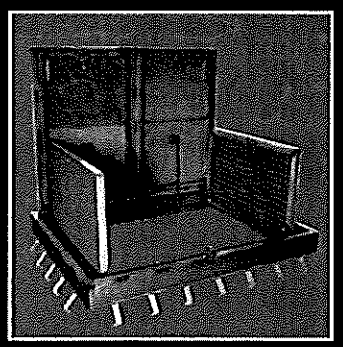
Checkout These End User Benefits:

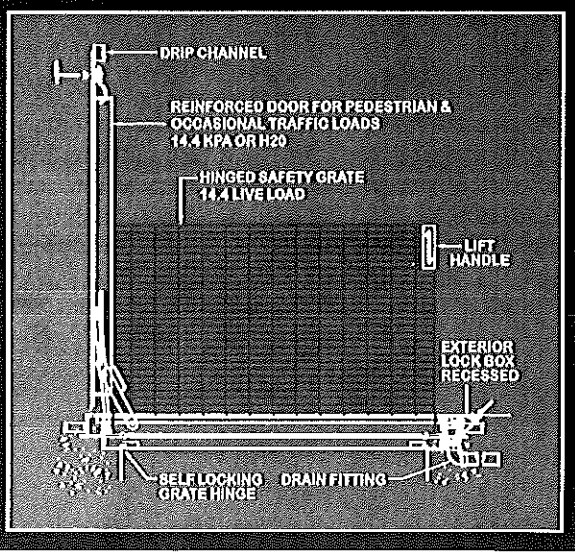
- Limitless Configurations
  - Single Door
  - Double Door
  - Triple Door
  - Multi Door
- Wide Range of Materials to Suit Any Environment
  - Aluminum
  - Stainless Steel, Types 304 and 316
  - FRP (grating only)
- Limitless Custom Design Possibilities
  - Heavy duty loadings, all designed by Professional Engineers
  - Standard and Custom Sizes and Shapes



the safest access hatch!







The MSU MG Hatch: The Safest Access Hatch!

Safety and Durability Features Galore

- Slip resistant checkerplate lid for pedestrian loading of 14.4 kPa (300psf) standard
- All Type 316 stainless steel hardware throughout
- Fall through protection grating
- Locking hold open arms
- Safety Orange grates create a highly visible safety barrier
- Openings in safety grating allow for visual inspection of the structure and lowering of instruments while offering complete fall through protection.
- CSA certified welding to CSA W47.1 and W47.2
- Gas springs for smooth and easy operation

Always follow confined space entry procedures.

Contact us today!

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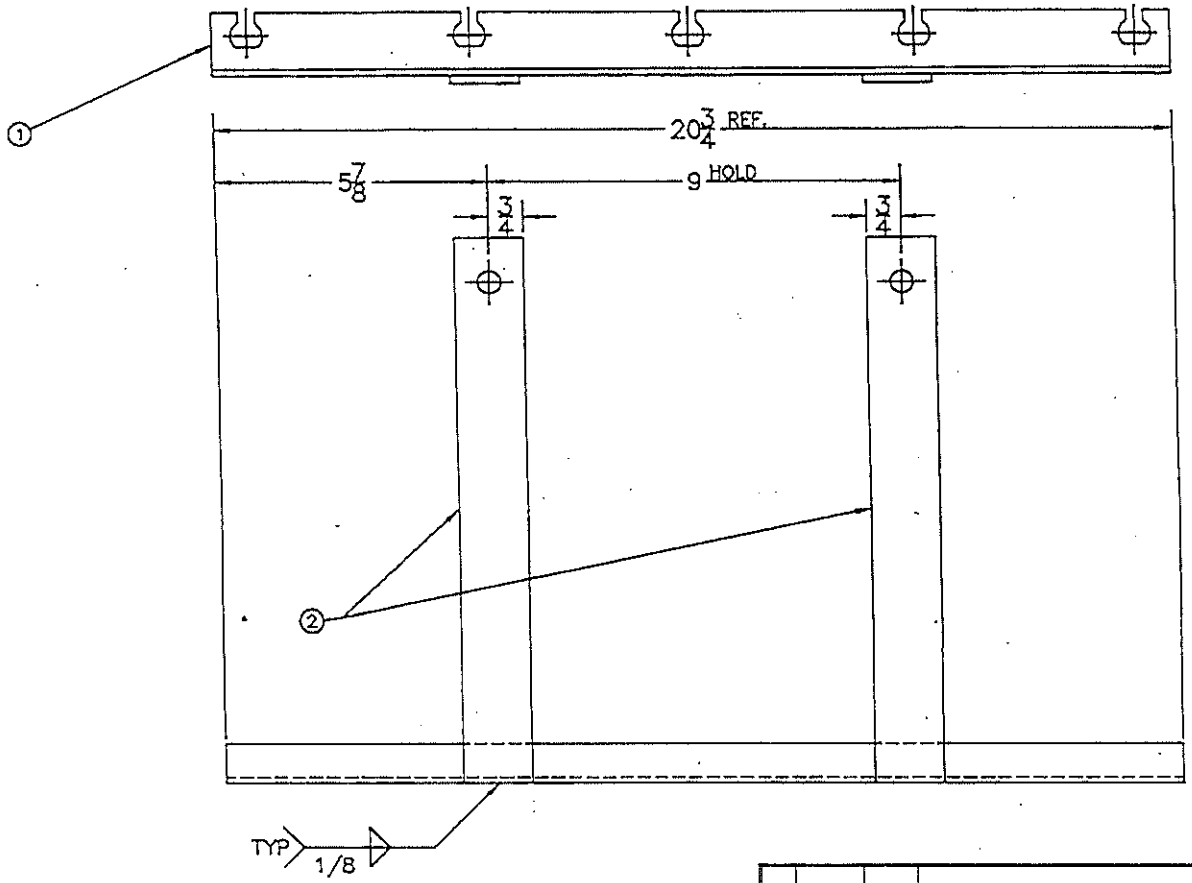
DEDICATED TO YOUR SERVICE SINCE 1977

DRAWING NUMBER
3962-037-5



ITEM NO.	DESCRIPTION	PART NO.	QTY
1	HANGER-FLOAT 1/8" x 2" x 20-3/4" SST304	7132-008-3	1
2	STRIP 3/16" x 1-1/2" x 12" SST304	12166-008-3	2

REV.	LOG NO.	DATE	REVISION DESCRIPTION	BY
B	503348	10-12-00	REDRAWN/ CORRECTED BOM	SDC

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DECIMAL
2 PLACE .XX ± .010"
3 PLACE .XXX ± .005"
ANGLES ± 0° 30'
FINISH ~ 125 RMS
FRACTIONAL
UP TO 12" ± 1/32"
12" & UP ± 1/16"
ANGLES ± 2°

DO NOT SCALE DRAWING

PLOT SCALE 1-2.5

MATERIAL: 304 SST

HYDROMATIC PUMPS

MOUNTING BRACKET ~ TRIPLEX

DRAWN BY	DATE	CHECKED BY	SHEET OF
SDC	10-12-00		1 OF 1

PART NUMBER	SIZE	DRAWING NUMBER	REV.
3962-037-5	B	3962-037-5	B

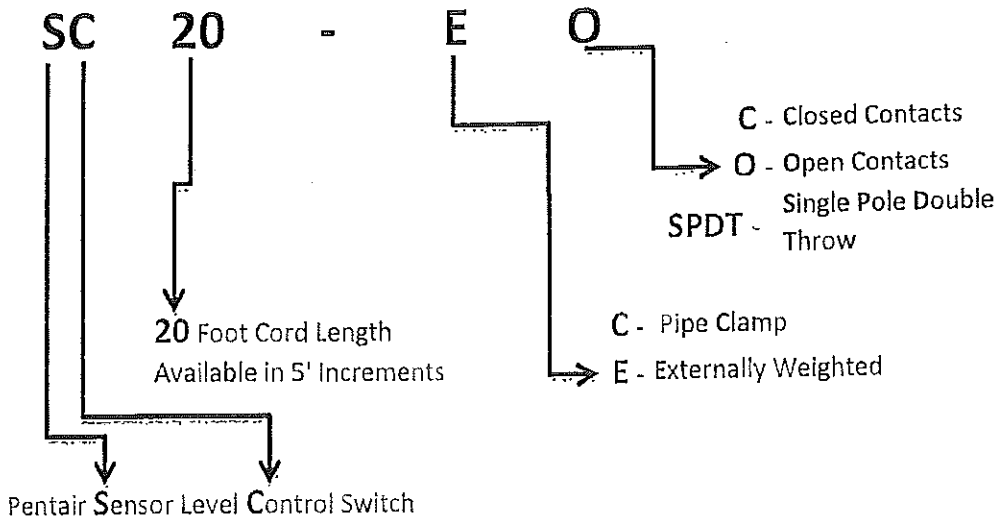
PENTAIR SENSOR LEVEL CONTROL SWITCHES
CONTRÔLE DE NIVEAU PENTAIR

NARROW ANGLE, 2 WIRE LEVEL CONTROLS - MERCURY FREE
CONTRÔLE DE NIVEAU À 2 FILS , ANGLE ÉTROIT – SANS MERCURE

CAT. NO. DE CAT.	CORD LG/LONG DU FIL	CONTACTS NORMALLY NORMALEMENT	WEIGHTED PONDÉRÉ	WT/PDS LB/KG	LIST PRICE PRIX DE LISTE
SC10-EO	10 ft./pi.	Open/Ouvert	Externally/Externe	2.7/1.2	
SC15-EO	15ft./pi.			3.1/1.4	
SC20-EO	20ft./pi.			3.3/1.5	
SC25-EO	25ft./pi.			3.7/1.7	
SC30-EO	30ft./pi.			4.0/1.8	
SC35-EO	35ft./pi.			4.4/2.0	
SC40-EO	40ft./pi.			4.8/2.2	
SC50-EO	50ft./pi.			5.5/2.5	
SC25-EC	25ft./pi.	Closed/Fermé		3.7/1.7	
SC30-EC	30ft./pi.			4.0/1.8	
SC35-EC	35ft./pi.			4.4/2.0	
SC50-EC	50ft./pi.			5.5/2.5	

For cords longer than 50 ft., add $4.00 per five foot increment. Pour les cordons de plus de 50 pieds, ajouter 4.00$/5 pieds.
Panel Duty Rated @ 5 amps, 115/1/60Hz. Panneau de service évalué à 5 amps, 115/1/60Hz.
Mercury-free liquid level control with polypropylene float.
Contrôle de niveau à liquide sans mercure avec flotte en polypropylène.
Maximum temperature: 60 deg C (140 deg F) Température maximale à 60°C (140°F).

Narrow Angle, 5 Amp, Panel Duty Level Controls Nomenclature



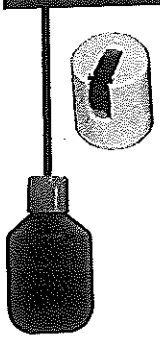
Pentair Canada, Inc.

Control Switch Installation Instructions

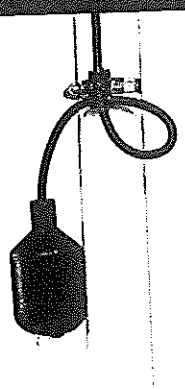
Pentair Canada, Inc. narrow angle control switches accurately monitor liquid levels in sewage, and non-potable water applications. These switches are designed to activate pump control panels and alarms.

Pentair sensor level control switches passed NSF Standard 61 protocol by an approved Water Quality Association laboratory for use in potable water applications.

Sensor Level Control Switches (two wire and SPDT)



- Mechanically activated.
- Control differential of 1.5 inches above or below horizontal.
- Not sensitive to rotation.
- Mounting options: mounting clamp or cable weight.
- 5 amp rating



Optional clamp assembly configuration.

PREVENTATIVE MAINTENANCE

- Periodically inspect the product. Check that the cable has not become worn or that the housing has not been damaged so as to impair the protection of the product. Replace the product immediately if any damage is found or suspected.
- Periodically check to see that the float is free to move and operate the switch.
- Use only Pentair Canada, Inc. replacement parts.

PENTAIR CANADA, INC. THREE-YEAR LIMITED WARRANTY

PENTAIR CANADA, INC. warrants to the original consumer that this product shall be free of manufacturing defects for three years after the date of consumer purchase. During that time period and subject to the conditions set forth below, **PENTAIR CANADA, INC.** will repair or replace, for the original consumer, any component which proves to be defective due to defective materials or workmanship of **PENTAIR CANADA, INC.**.

ELECTRICAL WIRING AND SERVICING OF THIS PRODUCT MUST BE PERFORMED BY A LICENSED ELECTRICIAN.

THIS WARRANTY DOES NOT APPLY: (A) to damage due to lightning or conditions beyond the control of **PENTAIR CANADA, INC.**; (B) to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with printed instructions provided; (C) to failures resulting from abuse, misuse, accident, or negligence; (D) to units which are not installed in accordance with applicable local codes, ordinances, or accepted trade practices, and (E) to units repaired and/or modified without prior authorization from **PENTAIR CANADA, INC.**.

Some states/provinces do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states/provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state/province to state/province.

TO OBTAIN WARRANTY SERVICE: The consumer shall assume all responsibility and expense for removal, reinstallation, and freight. Any item to be repaired or replaced under this warranty must be returned to **PENTAIR CANADA, INC.**, or such place as designated by **PENTAIR CANADA, INC.**.

ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS ARE LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. PENTAIR CANADA, INC. SHALL NOT, IN ANY MANNER, BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES AS A RESULT OF A BREACH OF THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY.