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ANNEX A - REVISED SPECIFICATIONS AND DRAWINGS

Petroleum Storage Tank Upgrades
Sandy Bay, SK

Solicitation No. ET022-170299/A
Project #: R.073302.002

www.pwgsc-tpsgc.gc.ca

List of Drawings

Drawing No.	**Title**
G001	Location and Site Plans
M001	Civil & Mechanical
E001	Electrical

List of Appendices

Appendix No.	**Title**
Appendix A	Sign Construction Specification
Appendix B	Environment Canada Storage Tank System Identification Form

Part 1 General

1.1 DRAWING REFERENCES

.1 G001 Location and Site Plans

.2 M001 Civil and Mechanical

.3 E001 Electrical

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work under this Contract covers the construction of a new gasoline dispensing system at the Sandy Bay RCMP Detachment, located in Sandy Bay Saskatchewan ('the site'). Work includes construction of the following:

- .1 New reinforced concrete tank pad.
- .2 One 9,100 litre double walled, steel Aboveground Storage tank (AST) for gasoline.
- .3 Fuel product transfer area to address spill containment and meet the requirements of the National Fire Code 2010 and Canadian Environmental Protection Act (CEPA) regulations.
- .4 New pump, piping, dispensing cabinet and appurtenances.
- .5 Aboveground piping from the tank to the dispenser.
- .6 Bollards and security fence.
- .7 Electrical for power and controls.

.2 For the purpose of this contract RCMP shall be considered the Owner, the Contractor shall be the Prime Contractor, and the Consultant or PWGSC will be the Departmental Representative.

1.3 Contract Method

.1 Construct work under single stipulated price contract.

1.4 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Supply and installation of the following:

- .1 1 – 9,100 litre steel, double wall, gasoline, AST to CSA S601 standard.
- .2 Concrete tank pad and spill containment berms.
- .3 Fuel dispensing cabinet with pump, meter, and hose reel.
- .4 Two (2) 40 pound BC fire extinguishers, and a 230 L petroleum spill kit in a wheeled container.

.5 Electrical supply and system grounding.

.6 Vehicle impact protection (bollards) and security fence.

.7 Relocation of the existing RCMP sign and associated electrical. Sign installation as per the original design attached as Appendix A.

.4 The contractor is responsible to supply and install all components to construct a complete working system as indicated on the contract drawings and the specifications.

.5 Maintain fire access/control.

.6 The Contractor shall provide the Departmental Representative with a current version of the Environment Canada (EC) Storage Tank System Identification Form with section IV completed, as soon as possible, after the tank is ordered. A blank copy of the EC Storage Tank System Identification Form is included in Appendix B. This information is required to obtain a tank identification number from Environment Canada. The new tank must be labeled with the Environment Canada tank ID number prior to product being delivered and prior to commissioning.

1.5 GENERAL REQUIREMENTS

.1 Perform Work in accordance with the most current edition of the:

.1 Storage Tank Systems for Petroleum and Allied Petroleum Products Regulations.

.2 National Building Code.

.3 National Fire Code.

.4 National Electrical Code.

.5 Installation Code for Oil Burning Equipment CAN/CSA-B139.

.6 Canadian Council of Ministers of the Environment - Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products

.7 Canadian Environmental Protection Act

.8 Canadian Labour Code Part II, Saskatchewan Workers' Compensation Board, Occupational Health and Safety and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.9 CEPA regulations require all petroleum installation and decommissioning to be completed by a certified petroleum installer registered in the Province of Saskatchewan.

.2 All work shall be performed in strict accordance with the drawings and specifications. If any conflicts exist, the drawings will prevail and the Departmental Representative shall be contacted immediately.

.3 Contractor shall obtain all required permits and be solely responsible for construction means, methods, techniques, sequences and procedures and for coordinating the various parts of the work.

.4 During the construction period the Contractor shall be responsible for the safety of the construction areas. The Contractor shall provide adequate shoring, bracing, and guys in accordance with all Federal, Provincial, and Municipal Safety Regulations, as well as all requirements of the Occupational Health and Safety Regulations of Saskatchewan.

.5 The Contractor shall be responsible for coordinating the work of all trades and shall check all dimensions. All discrepancies shall be called to the attention of the Departmental Representative and be resolved before proceeding with the work.

.6 Shop Drawings required by the specifications shall be submitted to the Departmental Representative for review prior to fabrication.

.7 Mechanical, civil and electrical drawings indicate size and location for all openings required for ducts, pipes and all pipe sleeves, electrical conduits and other items to be embedded in concrete or otherwise incorporated in structural work. All discrepancies shall be brought to the attention of the Departmental Representative and be resolved before proceeding with the work.

.8 Provide openings and supports, as required per details for, mechanical equipment, vents, ducts, pipes, etc. All suspended mechanical equipment to be sway or laterally braced.

.9 All information shown on the drawings relative to existing conditions is given as the best present knowledge, but without guarantee of accuracy. Where actual conditions conflict with the drawings they shall be reported to the Departmental Representative so that the proper revisions may be made. Modifications of details of construction shall not be made without written approval of the Departmental Representative. Where information on contract drawings conflicts with information given in this specification, the drawing information will prevail.

.10 Location of equipment and outlets indicated or specified are to be considered as approximate. All suspended mechanical equipment to be sway or laterally braced.

.11 The Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

.12 All work at this project shall be the responsibility of the Contractor.

1.6 LAYOUT OF THE WORK

.1 The Contractor shall be responsible for the layout of the work and shall assume full responsibility for the alignment, dimensions and elevations of each and every part of the Work and their mutual relationship.

1.7 SECURITY AND CONSTRUCTION SAFETY

.1 Security:

.1 The Contractor shall be responsible for security and safety of the Contractor equipment at all times for the duration of the Contract. This is to protect all associate workers, Departmental Representatives and all authorized personnel at the Place of Work during the construction period.

.2 Construction Safety:

.1 Refer to Technical Requirements Section 01 35 29.06 Health and Safety Requirements

1.8 PERMITS AND REGULATIONS

.1 The following permit applications shall be made by the contractor:

.1 Approval for the project by the Authority Having Jurisdiction.

.2 All other legislated construction requirements noted in 1.2 "GENERAL REQUIREMENTS" of this section and in the specifications shall be the responsibility of the Contractor to maintain compliance as required.

1.9 DOCUMENTS REQUIRED

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

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Material Safety Data Sheets for materials used on-site
.12 Other documents as specified.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Owner will use the building on-site during the entire Work period for execution of normal operations. Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Contractor is not permitted to use existing building facilities (washroom, meeting room, etc.)

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants.

.3 Provide for RCMP personnel and vehicular traffic.

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

1.4 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work Monday to Friday from 08:00 to 18:00 hours and on Saturdays, Sundays and statutory holidays: 09:00 to 17:00. The Contractor may be permitted to work outside these hours, with prior approval from the Owner.

.2 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar Chart.

.3 Ensure that Contractor 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.

1.5 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not allowed in the Work area, and is only allowed in areas as directed by the Departmental Representative.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings at the call of the Departmental Representative.

.2 Prepare agenda for meetings.

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

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within one day after meetings and transmit to meeting participants, affected parties not in attendance, and the Departmental Representative.

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

1.2 PRECONSTRUCTION MEETING

.1 Within 10 working days after award of Contract, the Departmental Representative will request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

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

.3 Establish time of meeting and notify parties concerned minimum 5 working days before meeting.

.4 Agenda to include:

- .1 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar Chart.
- .2 Proposed working hours.
- .3 Submittals, including Review of Contractor Health and Safety Plan.
- .4 Schedule of submission of shop drawings and samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .5 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
- .6 Delivery schedule of specified equipment and supplies.
- .7 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.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 Appointment of inspection and testing agencies or firms.

1.3 PROGRESS MEETINGS

.1 During course of Work and 1 week prior to project completion, schedule progress meetings weekly, or as directed by the Departmental Representative.

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

.3 Notify parties minimum 3 working days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 2 working days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Review of project schedules and identified problems.

.5 Corrective measures and procedures to regain projected schedule.

.6 Progress schedule, during succeeding work period.

.7 Review submittal schedules: expedite as required.

.8 Maintenance of quality standards.

.9 Review proposed changes for affect on construction schedule and on completion date.

.10 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 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: 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 Chart submission.

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

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

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

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

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

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

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

1.3 SUBMITTALS

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

.2 Submit to Departmental Representative within 10 working days of Award of Contract Bar Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart.

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.
.2 Shop Drawings.
.3 Mobilization.
.4 Excavation and Site Preparation.
.5 Concrete Slab Reinforcement.
.6 Concrete Slab Pour.
.7 AST Installation.
.8 Piping.
.9 Electrical.
.10 Controls.
.11 Testing and Commissioning.
.12 Fencing and Bollard Construction.
.13 Cleanup and Demobilization.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

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

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

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

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

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

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

.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review of submission, unless Departmental Representative gives written acceptance of specific deviations.

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

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

.10 Engineering costs may be charged to the Contractor where documents are resubmitted without all changes required 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 Accompany submissions with transmittal letter containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data, and sample.
- .5 Other pertinent data.

.4 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.

.4 Identification of product or material.

.5 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements, and compliance with Contract Documents.

.6 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

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

.6 Submissions not meeting the requirements of this section will be returned to the contractor without review for resubmission.

1.3 LIMITATIONS OF REVIEW

.1 The Departmental Representative shall review all Contractor submittals, such as health and safety plans, shop drawings, product data, samples and other data, as required by the Departmental Representative, but only for the limited purpose of checking for general conformance with the design concept and the information expressed in the Contract Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction of safety precautions, all of which are the sole responsibility of the Contractor. The Departmental Representative's review shall be conducted with reasonable promptness while allowing sufficient time in the Departmental Representative's judgment to permit adequate review. Review of a specific item shall not indicate that the Departmental Representative has reviewed the entire assembly of which the item is a component. The Departmental Representative shall not be responsible for any deviations from the Contract Documents not brought to the attention of the Departmental Representative in writing by the Contractor. The Departmental Representative shall not be required to review partial submission or those for which submission of correlated items have not been received.

1.4 SHOP DRAWINGS

.1 Submit original drawings, or modified standard drawings to illustrate details of portions of Work, which are specific to project requirements.

.2 Maximum sheet size: 850 x 1,050 mm.

.3 Submit shop drawings as follows:

.1 Opaque diazo prints, photocopies, or PDF copies of the original manufacturer's information.

.2 Number Contractor requires for distribution plus 3 copies to be retained by Departmental Representative.

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

1.5 PRODUCT DATA

.1 Certain Specification Sections specify that manufacturer's catalogue sheets, brochures, literature, performance charts and diagrams, and other standard descriptive data used to illustrate standard manufactured products will be accepted in lieu of shop drawings.

.2 Submit 3 copies of product data.

.3 Show dimensions and clearances required.

.4 Delete information not applicable to project.

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

.6 Show performance clearances required.

.7 Show wiring diagrams and controls.

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

1.6 SAMPLES

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

.2 Where colour, pattern, or texture is criterion, submit full range of samples.

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Transportation Association of Canada Manual of Uniform Traffic Control Devices (MUTCD) for Streets and Highways (Latest Edition).

1.2 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and Bylaws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 Do not close any lanes of road without approval of the Owner and the Departmental Representative. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in Part D of MUTCD.

.3 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of Departmental Representative.

1.3 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights, and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Part D, Temporary Conditions Signs and Devices, of the MUTCD.

.3 Place signs and other devices in locations recommended in the MUTCD.

.4 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Departmental Representative.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

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

.1 Material Safety Data Sheets (MSDS).

.3 Province of Saskatchewan

.1 Occupational Health and Safety Act, 1993, S.S. [2005].

1.2 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 working days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit one copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.

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

.5 Submit copies of incident and accident reports to the Departmental Representative within 7 days occurrence.

.6 Submit WHMIS MSDS - Material Safety Data Sheets.

.7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

.8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

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

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

1.3 FILING OF NOTICE

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

1.4 SAFETY ASSESSMENT

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

1.5 GENERAL REQUIREMENTS

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

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

1.6 RESPONSIBILITY

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

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

1.7 COMPLIANCE REQUIREMENTS

.1 Comply with Saskatchewan Occupational Health and Safety Regulations, 1996 (latest edition).

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

1.8 UNFORSEEN HAZARDS

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

1.9 HEALTH AND SAFETY CO-ORDINATOR

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

.1 Have site-related working experience specific to activities associated with AST system construction.

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

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

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

.5 Be on site during execution of Work.

1.10 POSTING OF DOCUMENTS

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

1.11 CORRECTION OF NON-COMPLIANCE

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

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

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

1.12 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

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

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Environmental protection plan: include:

.1 Name[s] of person[s] responsible for ensuring adherence to Environmental Protection Plan.

.2 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided.

.3 Drawings showing locations of proposed material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.4 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.5 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.6 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal laws and regulations for storage and handling of these materials.

.7 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water.

1.3 FIRES

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

1.4 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

.3 Prevent discharges containing asphalt, grout, concrete, concrete wash water, or other waste materials from discharging on-site.

1.5 DRAINAGE

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan and Federal laws and regulations.

.2 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

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

.4 Control disposal or runoff of water containing suspended materials or other harmful substances.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties to the site.

.2 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.3 Minimize stripping of topsoil and vegetation.

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

1.7 POLLUTION CONTROL

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

.2 Control emissions from equipment to 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.

1.8 HISTORICAL / ARCHAEOLOGICAL CONTROL

.1 Should any archaeologically significant items be encountered during work, all work will stop pending assessment by the Departmental Representative.

.2 Any archaeologically significant items encountered remain the property of the Crown.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water, as detailed in Section 01 35 43 - Environmental Procedures.

1.4 WATER SUPPLY

.1 Owner will provide supply of potable water for construction use.

1.5 TEMPORARY POWER AND LIGHT

.1 Owner will provide temporary electrical power during construction in accordance with Section 01 52 00 - Construction Facilities.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for all temporary communication necessary for own use to complete the Work.

1.7 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

Not used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of site trailers to be used, avenues of ingress/egress to fenced area, and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.3 TEMPORARY FACILITIES

.1 Furnished by Contractor:

.1 The Contractor shall be responsible for connection and disconnection of temporary power, water and communication systems, as noted below. Contractor shall, as a part of work, supply, install, properly maintain and remove all temporary construction facilities and utilities necessary for full and complete performance of the Work. Such items shall include, but not necessarily be limited to, those listed below. The type of facilities, move-in and move-out dates and locations on job site shall be subject to and in accordance with, the review and approval of the Owner:

.1 Meeting facilities.

.2 First aid facilities.

.3 Fuels and lubricants including heating fuels.

.4 Transportation facilities, on and off the site.

.5 Telephone services.

.6 Compressed air and gases.

.7 Maintenance of Contractor’s letdown, storage and work areas and roads within such areas including lockup area for material storage.

.8 All cranes and other necessary equipment for lifting and moving equipment.

.9 Non-destructive testing equipment.

.10 All small tools.

.11 Temporary lighting.

.12 All standard expendable or consumable construction items and supplies.

.13 All temporary buildings for use by the Contractor’s employees.

.14 Construction power (See 1.9.2 – "Furnished By Owner").

.15 Storage facilities for heavy equipment.

.16 Sanitary facilities.

.17 All items not supplied by the Owner.

.2 Furnished by Owner:

.1 Contractor's lay down area shall be restricted to the immediate area of the Work which will be defined by the Owner.

.2 Materials and equipment may be stored on-site in a neat and tidy fashion as approved by the Owner. The Owner will not be responsible for lost or stolen materials or equipment.

.3 Electrical Power is available in the areas of work.

1.4 CONTRACTOR'S OFFICE

.1 The Contractor shall provide a trailer on-site to utilize as an office.

1.5 CONSTRUCTION PARKING

.1 Parking will be permitted on site by the Owner provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

1.6 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt, mud, snow, or ice tracked onto paved or surfaced roadways.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary fencing around the work site during execution of Work.

.2 Remove from site all such work after use.

1.2 ACCESS TO SITE

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

1.3 FIRE ROUTES

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

1.4 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.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 MANUAL

.1 An organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems.

1.2 GENERAL INSTRUCTIONS

.1 Assemble, coordinate, bind, and index required data into Operation and Maintenance Manual.

.2 Submit four (4) hardcopies and four (4) electronic copies attached to each hard copy of the complete operation and maintenance manual to the Departmental Representative upon project completion.

.3 Material: label each section with tabs protected with celluloid covers fastened to hard paper dividing sheets.

.4 Type lists and notes.

.5 Drawings, diagrams, and manufacturer's literature must be legible.

1.3 BINDERS

.1 Binders: vinyl, hard covered, 3 "D" ring, loose leaf, sized for 215 x 280 mm paper, with spine pocket.

.2 Identify contents of each binder on spine.

1.4 CONTENTS

.1 Cover sheet containing:

.1 Date submitted.

.2 Project title, location, and project number.

.3 Names and addresses of Contractor and all subcontractors.

.2 Table of Contents of all binders.

.3 List of maintenance materials provided.

.4 List of special tools provided.

.5 List of spare parts provided.

.6 Warranties, guarantees.

.7 Copies of approvals and certificates.

1.5 PRODUCT DATA

.1 Provide the following data:

.1 List of equipment including service depot.

.2 Nameplate information including equipment number, make, size, capacity, model number, and serial number.

.3 Parts list.

.4 Installation details.

.5 Operating instructions.

.6 Maintenance instructions for equipment.

.7 Maintenance instructions for finishes.

.2 Shop drawings:

.1 One complete set of reviewed final shop drawings and product data.

Part 2 Products

2.1 NOT USED

2.1.1 Not used.

Part 3 Execution

3.1 NOT USED

3.1.1 Not used.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.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.

.3 Clear snow and ice from access to site, remove from site.

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

.5 Dispose of waste materials and debris off site.

1.2 FINAL CLEANING

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

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

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

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

.5 Remove stains, spots, marks and dirt from electrical and mechanical fixtures.

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

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

.9 Remove snow and ice from access to site.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 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 OF SECTION

Part 1 General

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and Subcontractors: 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 that corrections have been made.

.2 Request Departmental Representative Inspection.

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

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

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

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

.3 Environment Canada (EC) Tank Registration has been submitted by Owner and tank system has been labelled with EC ID number.

.4 Equipment and systems have been tested and are fully operational.

.5 Certificates required by Fire Commissioner have been submitted.

.6 Operation of systems has been demonstrated to Owner's personnel.

.7 Commissioning of mechanical systems has been completed in accordance with -1 91 13 – General Commissioning Requirements and Commissioning Report has been submitted to the Departmental Representative.

.8 Work is complete and ready for final inspection.

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

.5 Declaration of Substantial Performance: when Owner and Departmental Representative consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Furnish evidence, if requested, for type, source and quality of products provided.

.3 Defective products will be rejected, regardless of previous inspections. Replace products at Contractor's expense.

.4 Pay costs of transportation.

1.2 AS-BUILTS AND SAMPLES

.1 Maintain 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.
- .9 Health and Safety Plan.
- .10 Environmental Protection Plan.
- .11 Spill Response Plan.

1.3 RECORDING ACTUAL SITE CONDITIONS

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

- .1 Surveyed locations of underground utilities and appurtenances by a land surveyor registered with the Saskatchewan Land Surveyor's Association.
- .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .3 Field changes of dimension and detail.
- .4 Changes made by change orders.
- .5 Details not on original Contract Drawings.
- .6 References to related shop drawings and modifications.

.2 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.

1.4 FINAL SURVEY

.1 Submit final site survey certificate, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.5 EQUIPMENT AND SYSTEMS

.1 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.2 Include installed colour coded wiring diagrams.

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

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

.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 installed control diagrams by controls manufacturer.

.9 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.10 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.11 Include test and balancing reports.

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to performance verification (PV) of components, equipment, sub-systems, systems, and integrated systems.

.2 Related Requirements

.1 All other sections.

.3 Acronyms:

.1 AFD - Alternate Forms of Delivery, service provider.

.2 OMM – Operation and Maintenance Manual.

.3 Cx - Commissioning.

.4 EMCS - Energy Monitoring and Control Systems.

.5 O M - Operation and Maintenance.

.6 PI - Product Information.

.7 PV - Performance Verification.

.8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

.1 Commissioning (Cx) is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

.1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.

.2 Ensure appropriate documentation is compiled into the Operations and Maintenance manual (OMM).

.3 Effectively train Operation and Maintenance (O M) staff.

.2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency.

.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

.4 Cx will require fuel in the new tank. Fuel delivery will be coordinated by the Owner. Fuel cannot be delivered into the tank until it is labeled with an Environment Canada tank

ID number. Contractor is to ensure that the new tank is labelled with the EC ID number before first filling. It is the Contractor's responsibility to schedule commissioning to coincide with the EC Tank ID labelling.

1.3 COMMISSIONING OVERVIEW

.1 Cx Plan to be provided a minimum of 14 days prior to Cx.

.2 Cx to be a line item of Contractor's cost breakdown.

.3 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.4 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities include transfer of critical knowledge to facility operational personnel.

.5 Departmental Representative will issue Interim Acceptance Certificate when:

.1 Completed Cx documentation has been received, reviewed for suitability and approved by the Departmental Representative.

.2 Equipment, components and systems have been commissioned.

.3 O M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor.

1.5 PRE-CX REVIEW

.1 Before Construction:

.1 Review contract documents, confirm by writing to Departmental Representative.

.1 Adequacy of provisions for Cx.

.2 Aspects of design and installation pertinent to success of Cx.

.2 During Construction:

.1 Co-ordinate provision, location and installation of provisions for Cx.

.3 Before start of Cx:

.1 Have completed Cx Plan up-to-date.

.2 Ensure installation of related components, equipment, sub-systems, and system is complete.

.3 Fully understand Cx requirements and procedures.

.4 Understand completely design criteria and intent and special features.

.5 Submit complete start-up documentation to Departmental Representative.

.6 Have Cx schedules up-to-date.

.7 Ensure systems have been cleaned thoroughly.

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

1.6 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Submit no later than 4 weeks after award of Contract and prior to Cx:

.1 Name of Contractor's Cx agent.

.2 Draft Cx documentation.

.3 Preliminary Cx schedule.

1.8 COMMISSIONING DOCUMENTATION

.1 Provide completed and approved Cx documentation to Departmental Representative.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar Chart.

.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:

.1 Approval of Cx reports.

.2 Verification of reported results.

.3 Repairs, retesting, re-commissioning, re-verification.

.4 Training.

1.10 STARTING AND TESTING

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

1.11 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice to Departmental Representative prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

.3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.12 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

.2 Correct deficiencies and obtain approval from Departmental Representative.

.3 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:

.1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.

.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.

.3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.

.1 Rejected equipment to be removed from site and replaced with new.

.2 Subject new equipment/systems to specified start-up procedures.

1.13 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.

.2 Start-up documentation to include:

.1 Environment Canada Tank Number must be visible prior to fuelling the tank.

.2 Factory and on-site test certificates for specified equipment.

.3 Pre-start-up inspection reports.

.4 Signed installation/start-up check lists.

.5 Start-up reports,

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

1.14 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 With assistance of manufacturer develop written maintenance program and submit to Departmental Representative for approval before implementation.

.2 Operate and maintain systems for length of time required for commissioning to be completed.

1.15 TEST RESULTS

.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.16 START OF COMMISSIONING

.1 Notify Departmental Representative at least 14 days prior to start of Cx.

.2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.17 INSTRUMENTS / EQUIPMENT

.1 Submit to Departmental Representative for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

.2 Provide the following equipment as required:

.1 Equipment as required to complete work.

1.18 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under accepted simulated operating conditions, over entire operating range, in all modes.

.2 On independent systems and interacting systems.

.2 Cx procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment manufacturer's operating instructions.

1.19 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.20 AUTHORITIES HAVING JURISDICTION

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

.3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

1.21 EXTRAPOLATION OF RESULTS

.1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.22 SUNDRY CHECKS AND ADJUSTMENTS

.1 Make adjustments and changes which become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

1.23 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.

.2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.24 COMPLETION OF COMMISSIONING

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.25 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.26 TRAINING

.1 Provide system operation and maintenance training to a representative of the owner.

1.27 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.28 OWNER'S PERFORMANCE TESTING

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 STANDARD

.1 Concrete materials and methods of construction: to CAN/CSA-A23.1 unless otherwise specified. All codes to be most current at time of tender.

1.2 INSPECTION

.1 Contractor to provide the Departmental Representative with photographs of the reinforcing prior to pouring concrete. Concrete to be poured after receiving Departmental Representative's written approval.

1.3 SHOP DRAWINGS

.1 Not required

Part 2 Products

2.1 MATERIALS

.1 Portland cement: to CAN/CSA-A5, Type 10, sulphate resistant.

.2 Portland cement: to CAN/CSA-A5, Type 10.

.3 Shrinkage compensating grout: pre-mixed, non-metallic aggregate, 50 MPa compressive strength at 28 days.

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

.5 Welded steel wire fabric: to CSAG30.5- M.

.6 Premoulded joint filler:
- .1 Closed cell sponge polyethylene to ASTM D1056.
- .2 Foamtec or approved alternate.

.7 Joint sealer/filler:
- .1 To CAN/CGSB-19.24- M, Type 1, Class B.
- .2 Sikaflex 2C NS/SC or approved alternate.

.8 All other concrete materials: to CAN/CSA-A23.1.

2.2 MIX PROPORTIONS

.1 Method: Alternative (1) of CAN/CSA-A23.1.

.2 Cement type: as specified under 2.1.

.3 Minimum 28-day compressive strengths and exposure classifications:
- .1 Curbs, and exposed site concrete: 32 MPa; C-2.

.4 Nominal size of coarse aggregate: Clause14 of CAN/CSA-A23.1.

.5 Slump: to Table 6 of CAN/CSA-A23.1.

.6 Joint sealer/filler:
- .1 To CAN/CGSB-19.24- M, Type 1, Class B.
- .2 One part, moisture curing, elastic joint sealant based on polyurethane.
- .3 Suitable for use at a gasoline filling station.
- .4 Movement capability 25%.

.5 Service temperature -40°C to +70°C.
.6 Designed for use on horizontal and vertical joints of poured concrete.
.7 Supply backer or release material for joints as recommended by manufacturer.

.7 Admixtures: to Clause 6 of CAN/CSA-A23.1.

Part 3 Execution

3.1 INSERTS

.1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers, and other inserts required to be built-in. Sleeves and openings greater than 100 mm x 100 mm not indicated, must be approved by Departmental Representative.

3.2 COLD WEATHER CONCRETING

.1 Contractor to provide a preconstruction plan for Placing, Finishing and Curing Concrete at temperatures below 5° Celsius. Plan to be developed in accordance with CSA A23.1-14 / A23.2-14 and provided to the Departmental Representative prior to construction start.

3.3 FINISHES

.1 Equipment pads: smooth trowelled surface; finishing tolerance classification: Very Flat.

.2 Pavements, walks, curbs, and exposed site concrete: screed to plane surfaces and float using aluminum, magnesium, or wood floats. Round edges and provide joint spacings using standard tools. Trowel smooth followed by lightly brushed non-slip finish.

3.4 CURING

.1 Cure and protect concrete in accordance with CAN/CSA-A23.1, except that curing compounds shall not be used where bond is required by subsequent topping or coating.

3.5 GROUT

.1 Grout voids under base plates.

.2 Grout into place, bolts and other items of concrete hardware, that are not placed prior to pouring concrete.

.3 Mix and place grout.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 03 05 10 – Cast-in-Place Concrete – Short Form.

1.2 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.

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

1.3 SHOP DRAWINGS

.1 Not Required.

1.4 MEASUREMENT FOR PAYMENT

.1 No measurement will be made under this section. Include costs in items of concrete work for which reinforcement is required.

1.5 SUBSTITUTES

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

Part 2 Products

2.1 MATERIALS

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

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

.3 Cold-drawn annealed steel wire ties: to CSA G30.3.

.4 Deformed steel wire for concrete reinforcement: to CSA G30.14.

.5 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.

.6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

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

.8 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

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

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

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

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

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

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

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

3.3 FIELD TOUCH-UP

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

END OF SECTION

Part 1 General

1.1 PIPING

.1 All work covered by this section shall be carried out in accordance with, but not limited to the following standards, which shall be deemed to be and form part of this specification.

.1 American National Standards Institute:

B31.3 – "Chemical Plant and Petroleum Refinery Piping"

B2.1 – "Pipe Threads"

B16.50 – "Steel Pipe Flanges and Flanged Fittings"

B16.90 – "Steel Butt-weld Fittings

B16.11 – Forged Steel Fittings Socket Welding and Threaded

B16.21 – "Non-Metallic Gaskets for Pipe Flanges"

B18.20 – "Square and Hex Nuts and Bolts"

B16.25 – "Butt Welding Ends"

.2 Boiler and Pressure Vessel Regulations of the Province of Saskatchewan.

.3 American Society of Mechanical Engineers: ASME Boiler and Pressure Vessel Code.

.4 Applicable Municipal and Regional Codes

1.2 MATERIALS

.1 Steel Pipe – Class 150

Steel pipe, valves and fittings shall meet the following requirements:

.1 40mm and down - Steel, seamless, Schedule 80, API 5L, Gr.B threaded or socket ends.

.2 50mm - Steel, seamless, XS, API 5L Gr.B plain or B.W. ends.

.2 Stainless Steel Pipe - 304L, Schedule 40

.3 Petroleum Tubing/Fittings

.1 Tubing: Type 316 stainless steel, ASTM A-269, seamless, full annealed, max. RB80, 12mm O.D. x 1.3mm wall thickness.

.2 Tube Fittings: 316 SS compression type.

.3 Shut-Off Valves: 316 SS compression type.

.4 Fusible link valve – 12mm.

.5 Flexible Metal Hoses: 316SS tube with SS overbraid, 12mm nominal hose I.D., 900mm minimum length.

.4 Fittings

.1 40mm and down – ANSI Class 3000 CWP, steel, A-105 forged, threaded or socket

.2 50mm – B.W., carbon steel, std. Wt., A-234 Gr.WPB

1.3 INSTALLATION - GENERAL

.1 All work to meet local, Provincial, and Federal Acts, codes, and regulations, installed and tested to the satisfaction of governing fire authority and Departmental Representative. Fuel system installation work is to be done by an ITA Certified Petroleum Installer certified by the Province of Saskatchewan. Certificates to be provide with bid. PWGSC requires the ITA Certified Petroleum Installer to provide a signed record that they completed the installed works as per CEPA Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products, and the National Fire Code.

.2 Fabrication of all piping shall be as per CSA B139-09, ANSI B31.3 and ASME Boiler and Pressure Vessel Codes as applicable.

.3 Piping to be installed fitted and tested only by a petroleum pipe fitter of journeyman status. Journeyman certificates to be provided with bid.

.4 All piping must be flushed and tested.

.5 The use of close nipples is not permitted.

.6 The use of street elbows or 45 degree elbows for swing joints is not permitted.

.7 The Contractor shall follow the drawings in all matters concerning the location and placement of all pipe, valves, fittings and supports, and no changes are to be made from the drawings without prior written permission from the Departmental Representative.

.8 Pipes shall be adequately supported to prevent abnormal stress from being imposed on equipment. Inaccuracies in pipe fabrication causing stress to be imposed on the equipment will not be permitted. The Departmental Representative reserves the right, if he deems it desirable, to have flanged joints unbolted at the equipment flanges to determine if there is any misalignment. Unsatisfactory workmanship shall be corrected by re-adjustment of pipe supports, anchor points, or re-fabrication.

.9 All pipe and fittings must be swabbed clean (i.e. wire with a rag) prior to their assembly.

.10 After a pipe or fitting has been swabbed, plug the end with a rag or other device.

.11 Pipes shall be accurately cut to length so as to permit normal thread engagement between male and female threads.

.12 Threads shall be tapered and smooth, cut with the correct taper, lead, thread angle and diameter and shall conform to NPT (A.S.A.-B2-1-1945).

.13 After completion of installation, all scale, dirt, welding electrodes, slag, rags and other foreign materials shall be removed from the lines.

.14 Each joint shall be cleaned to remove dirt, loose mill scale or foreign substances before placing pipe in alignment for welding.

.15 Pipe not yet in use or in material stock pile on site shall be plugged with a rag or similar device to prevent foreign material from entering the pipe.

.16 All practical precautions shall be taken to prevent the introduction of foreign material into instruments, valves, meters, loaders, pumps and any other equipment.

1.4 ABOVEGROUND PIPE INSTALLATION

.1 Pipelines must be located aboveground, in parallel banks, plumb and true to provide a neat, orderly arrangement.

.2 Pipeline runs located as shown on plot plan and piping plan. Spaced centre to centre.

.1 40 mm and smaller - 150 mm C.C.

.2 50 mm – 200 mm C.C.

.3 Pipe Supports

.1 Pipe supports/hangers shall be provided to support lines from 20 mm to 75 mm diameter every 2400 mm minimum and 100 mm to 300 mm diameter every 6500 mm or as shown on drawings.

.2 If variations to .1 above are indicated on the drawings, the drawings shall govern.

1.5 INSPECTION AND TESTING

.1 The Contractor's work shall be available for inspection at any time by the Departmental Representative. All work shall be in accordance with and inspected and tested to meet the requirements of the standards specified.

.2 Contractor shall test valves for shut off and operation, and check packing for leakage.

.3 Defects disclosed in the work shall be made good or the work replaced without additional cost to the Owner.

.4 Test Procedures

.1 The Contractor's work shall be available for inspection at any time by the Owner. All work shall be in accordance with and inspected and tested to meet the requirements of the standards specified.

.2 Contractor shall test valves for shut-off and operation, and check packing for leakage.

.3 Defects disclosed in the work shall be made good or the work replaced without additional cost to the Owner.

.5 Repairs to piping systems shall be made with new material. No caulking or screwed joints, cracks, or holes will be acceptable. Where it becomes necessary to replace pieces of pipe, such replacements shall be the same lengths as the defective pieces.

1.6 PAINTING

.1 All aboveground pipelines including all vent lines and pipe supports are to be painted to meet CPPI Colour-Symbol System.

.2 Painting and coating shall be performed after inspection and testing of the pipe.

.3 Gasoline pipe, Vent pipe and Supports in White.

.4 Surface preparation: Sandblast to SSPC-SP6 Commercial Blast Cleaning or cleaned to

SSPC-SP11 Power Tool Cleaning to Bare Metal.

.5 Prime Coat: One coat (3 mils dry thickness).

.6 Final Coat: One coat (3 mils dry thickness).

.7 Contractor to touch up any paint damaged during installation.

Part 2 Products

1.2 NOT USED

.1 Not used.

Part 3 Execution

1.3 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 26 05 21 – Wire and Cables (0 – 1000V)

.3 Section 26 05 28 – Grounding – Secondary

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-12, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
- .2 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
- .1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear.

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC).
- .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

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

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Any reference to Codes, Standards, and Regulations in these Specifications shall be taken as the latest or the most current in effect at time of tender.

.3 Comply with all requirements of the NFPA 30A, National Building Code of Canada including Saskatchewan Amendments, Workers' Compensation Board requirements, and the CSA C22.1 Canadian Electrical Code - Part I, including all Provincial and other amendments, Electrical Bulletins, and any local by-laws or rules regulating the installation of electrical equipment and their seismic restraint. In no instance, however, shall the standards established by the Contract Documents be reduced by any of these Codes or Regulations.

.4 All equipment and materials shall bear the approval of the Canadian Standards Association and where applicable, the Underwriters' Laboratories of Canada or alternate shall bear local approval from the Electrical Inspection Department having jurisdiction. Include in the Tender all costs associated with obtaining local approvals.

.5 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
- .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

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

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS in accordance with Section 01 35 43 – Environmental Procedures.

.3 Shop drawings:
- .1 Submit drawings stamped and signed by a Professional Engineer registered or licensed in Province of Saskatchewan, 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 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .5 Submit 2 copies of 600 x 600 mm minimum size drawings and product data to inspection authorities.
- .6 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Provide CSA certified equipment and material.
- .1 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
- .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.

.5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing.

1.6 QUALITY ASSURANCE

.1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices 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.

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

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 SYSTEM STARTUP

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

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.9 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 by the Departmental Representative.

.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

1.10 MATERIALS AND EQUIPMENT

.1 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 Factory assemble control panels and component assemblies.

1.11 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Refer to mechanical drawings for pump and hose reel motors.

1.12 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction.

1.13 WIRING TERMINATIONS

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

1.14 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates and labels 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 and labels to be approved by Departmental Representative prior to manufacture.

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

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

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

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

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

1.15 WIRING IDENTIFICATION

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

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

1.16 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	

	Prime	Auxiliary
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

1.17 FINISHES

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

1.18 FIRESTOPPING

.1 Firestopping shall be performed by the Division 26 Contractor as required by the National Fire Code of Canada including Saskatchewan Amendments.

.2 Rated sealing systems for penetrations of Fire Rated walls, ceilings and floors. Contractors are to submit ULC, cUL, WHI, or equivalent certified Design or System Data Sheets to demonstrate compliance of a particular Floor or Wall Assembly, Through Penetrant, and Sealant with requirements and for what period of time.

.3 Submit product data of the proposed firestopping system for review prior to installation.

.4 The Departmental Representative, at his or her discretion, shall disassemble up to 10% of the total firestopping assemblies for detailed inspection. The contractor shall make good the inspected firestopping assemblies at no cost to the project.

.5 Should any of the inspected firestopping assemblies not comply with the manufacturer's assembly instructions or the National Fire Code of Canada including Saskatchewan Amendments, all firestopping assemblies shall be removed and replaced by the Division 26 Contractor at no cost to the Owner.

.6 All firestop penetrations shall be labelled. Labels shall be secured to surface directly beside firestop penetration. Firestop penetration labels shall include the following information:

.1 Name of installer

.2 Date of installation

.3 Type of sealing

.4 Time duration of sealant

Part 3 Execution

1.19 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 Install equipment as indicated on Drawings.

.4 Locations of all existing services, features and appurtenances shown on the drawings are to be considered approximate only. Verify all locations in the field prior to construction.

1.20 NAMEPLATES AND LABELS

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

1.21 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.

1.22 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.

1.23 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

1.24 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 OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCES

.1 CSA C22.2 No. 0.3 (latest edition) – Test Methods for Electrical Wires and Cables.

.2 CSA C22.2 No. 65 – Wire Connectors.

1.3 PRODUCT DATA

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

PART 2 PRODUCTS

2.1 WIRES

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

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

.3 All branch circuits shall be installed with separate, dedicated neutrals.

.4 All wiring shall be rated at 75^{O}C when connected to equipment rated 75^{O}C.

.5 All wiring shall be listed for the application for which it is installed.

2.2 TECK 90 HL CABLE

.1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Conductors:
- .1 Size as indicated on Drawings.
- .2 Grounding conductor: copper
- .3 Circuit conductors: copper, size as indicated.
- .4 Rated for hazardous areas as indicated on Drawings.

.3 Insulation: Chemically cross-linked thermosetting polyethylene, type RW90, rated 600 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:
- .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables at 2000 mm centers.
- .3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:
- .1 Watertight, explosion-proof approved for TECK cable.

2.3 OUTDOOR FLEXIBLE CABLES

.1 Approved for wet locations.

.2 Insulation: 90^{O} EPDM, type SOOW, rated 600V.

2.4 WIRE AND BOX CONNECTORS AND MISCELLANEOUS MATERIALS

.1 Connectors for wire and cable splices and taps.

.2 Clamps, glanding connectors, or box connectors for armoured cable, aluminum sheathed cable, mineral-insulated cable, flexible conduit, as required.

.3 Lugs, terminals, screws used for termination of wiring shall be suitable for either copper or aluminum conductors.

.4 Plastic electrical insulation tape.

.5 Kellems grips: double-eye, double-weave, stainless steel.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

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

.2 Perform tests 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 All wiring shall be in conduit unless otherwise indicated.

.2 Install cable in trenches in accordance with the Canadian Electrical Code and the Drawings.

.3 Terminate cables in accordance with the Canadian Electrical Code.

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

.5 Conductor length for parallel feeders to be identical.

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

.7 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.

.8 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF WIRES

.1 Install wiring in accordance with the Canadian Electrical Code.

.2 The number of splices in any circuit shall be kept to an absolute minimum consistent with available coil length and installation conditions.

.3 Branch circuits shall be sized for a maximum 3% voltage drop.

.4 Install cable in trenches in accordance with the Canadian Electrical Code and the Drawings.

.5 Cable Color Coding: to Section 26 05 00 Common Work Results for Electrical.

3.4 INSTALLATION OF TECK90 HL CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable exposed, securely supported by straps.

.3 Provide adequate protection and strain relief for cables between stub-up and devices.

.4 All cables shall include grounding conductor.

3.5 INSTALLATION OF FLEXIBLE CABLES

.1 Install flexible cables in existing raceways to dock.

3.6 INSTALLATION OF WIRE AND BOX CONNECTORS

.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 CSA C22.2 No. 65.

.2 Install fixture type connectors and tighten. Replace insulating cap.

.2 Wire and cable splices and taps shall be made with approved connectors used in accordance with the manufacturer's instructions.

.3 After installation, wrap connectors having exposed conductive surfaces with plastic electrical tape, applying enough servings to provide uniform covering not thinner than the insulation of the largest conductor connected and overlapping the insulation of each connected conductor by not less than 12mm.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCES

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
  .1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

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 grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

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

PART 2 PRODUCTS

2.1 EQUIPMENT

.1 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed, size as indicated on drawings.

.2 Rod electrodes: stainless steel 19 mm diameter by minimum 3 m long.

.3 Plate electrodes: galvanized steel surface area 0.2 m^2, minimum 6 mm thick.

.4 Grounding conductors: bare stranded copper, soft annealed, size as indicated.

.5 Insulated grounding conductors: green, copper conductors, size as indicated.

.6 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.

.7 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermit welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process, permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

.7 Minimum depth of burial for ground loop and grounding cables shall be minimum 450mm, maximum 600mm.

.8 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.9 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.10 Bond single conductor, metallic armoured cables to cabinet at supply end.

.11 Ground secondary service pedestals.

3.2 MAINTENANCE HOLES

.1 Install conveniently located grounding stud, electrode, size as indicated stranded copper conductor in each manhole.

.2 Install ground rod in each manhole so that top projects through bottom of manhole. Provide with lug to which grounding connection can be made. Confirm ground resistance meets or exceeds Canadian Electrical Code minimum requirements.

3.3 ELECTRODES

.1 Install rod and plate electrodes and make grounding connections as indicated.

.2 Bond separate, multiple electrodes together.

.3 Use size 2/0 AWG copper conductors for connections to electrodes.

.4 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.4 FIELD QUALITY CONTROL

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

.2 Perform ground continuity and resistance tests 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.

3.5 CLEANING

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

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No. 18.2-06, Nonmetallic Outlet Boxes.
- .2 CSA C22.2 No. 45.1-07, Rigid Metal Conduit – Steel.
- .3 CSA C22.2 No. 56-04 (R2009), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985(R2008), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-06(R2011), Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-05(R2010), Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.2 SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

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.

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

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 2 m 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.

.3 Watertight connectors and couplings for EMT.
- .1 Set-screws are not acceptable.

2.5 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 Conceal conduits except in mechanical and electrical service rooms.

.3 Surface mount conduits except where specified otherwise.

.4 Use rigid galvanized steel threaded conduit outdoors except where specified otherwise.

.5 Use epoxy coated conduit in corrosive areas.

.6 Use electrical metallic tubing (EMT) indoors, except where specified otherwise.

.7 Use explosion proof flexible connection for connection to explosion proof devices.

.8 Install conduit sealing fittings in hazardous areas.
- .1 Fill with compound.

.9 Minimum conduit size: 21 mm.

.10 Bend conduit cold:
- .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.11 Mechanically bend steel conduit over 27 mm diameter.

.12 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.13 Install fish cord in empty conduits.

.14 Remove and replace blocked conduit sections.
.1 Do not use liquids to clean out conduits.

.15 Dry conduits out before installing wire.

.16 Remove burrs and sharp edges of conduits prior to installation.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible on surface channels.

.4 Do not pass conduits through structural members except as indicated.

.5 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.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC accepted) with heavy coat of bituminous paint.

3.6 CLEANING

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

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

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International):

.1 CSA C22.2 No.14, Industrial Control Equipment.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 00.

PART 2 PRODUCTS

2.1 CONTACTOR EQUIPMENT

.1 Contactors: to CSA C22.2 No.14.

.2 Half size contactors not accepted.

.3 Electrically operated, electrically or mechanically held, multi-pole full voltage type.

.4 Contactors to have 120V operating (and unlatching) coils unless otherwise noted.

.5 Controlled by pilot devices as indicated and rated for type of load controlled.

.6 Breaker or Fused switch combination contactor as indicated.

.7 Complete with 1 normally open and 1 normally closed auxiliary contacts unless indicated otherwise.

.8 Provide National Electrical Manufacturers Association (NEMA) enclosure as required for location unless indicated otherwise.

2.2 CONTACTOR REMOTE CONTROLS

.1 Include following options in cover or in remote locations where indicated:

.1 Red LED indicating lamp (incandescent not acceptable)

.2 Stop-Start pushbutton or

.3 Hand-Off-Auto selector switch or

.4 On-Off selector switch.

.2 Include following remote control options where indicated:

.1 Key operated remote control buttons shall heavy duty type, momentary contact, two (2) position spring return to centre, key operated control switch complete with engraved lamicoid nameplate reading "Off/On". Provide and adjacent standard bullseye type, LED 120 volt rated, red pilot light indicating "power on". Mount pilot light on same faceplate as control switch. Confirm keying requirements (master/submaster) and provide 2 sets of keys.

.2 Mushroom style “STOP” controls to be heavy duty type, large red button, momentary contact, non-latching spring return switch complete with engraved lamicoid nameplate reading "STOP".

.3 Provide flush mounting boxes and satin stainless steel plates for remote control devices in finished areas. Provide industrial quality, malleable die cast surface mounted units to suit the application classification.

2.3 EQUIPMENT IDENTIFICATION

.1 Indicate name of load controlled on size 4 name plate to Section 26 05 00.

2.4 STANDARD OF ACCEPTANCE

.1 Cutler Hammer – Heavy Duty

.2 Schneider - Heavy Duty

.3 Siemens - Heavy Duty

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install contactors and connect auxiliary control devices.

.2 Pilot lights to be illuminated when contactor is closed.

.3 Control wire to be minimum #14 AWG. Remote control wiring to be 5A fuse protected and the wiring shall be upsized to limit voltage drop to no more than 2%.

.4 Control circuits shall fail safe leaving the contactor in the open position if the power fails or where automatic reset could be a safety or operational concern. Provide a control circuit seal-in contact for all momentary contact control devices unless otherwise indicated.

.5 The contactor shall not automatically reset after a power failure unless otherwise indicated or for such items as automatic freeze protection, snow melting, light control etc.

.6 Electrically held contactors to be located in service rooms where practical.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 Submittal Procedures

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

.3 Section 01 78 00 – Closeout Submittals

.4 Section 01 61 00 - Common Product Requirements

1.2 REFERENCES

.1 National Electrical Manufacturers Association (NEMA)
- .1 NEMA ICS 1-2000(R2008), Industrial Control and Systems: General Requirements.

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

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by a Professional Engineer registered or licensed in Province of Saskatchewan, Canada.
- .2 Include schematic, wiring, interconnection diagrams.

1.4 QUALITY ASSURANCE

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

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 control devices for incorporation into manual.

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 control devices from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 E-STOP BUTTONS

.1 Standard, marine grade, outdoor rated and hazardous area rated mushroom type. 1-NO and 1-NC contacts rated at 120 V, AC, labels as indicated. Stop pushbuttons coloured red, labeled "emergency stop".

.2 Provide marine, outdoor and hazardous area rated enclosures as required.

2.2 SWITCHES

.1 Hazardous area rated, 2 position switches as indicated on drawings. Standard wing lever rated at 120V AC, labels as indicated.

.2 Provide outdoor and hazardous area rated enclosures as required.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install switches and E-stop pushbuttons as indicated on the Drawings.

.2 Comply with all manufacturer’s installation instructions and requirements.

.3 Provide wiring for control devices.

3.2 FIELD QUALITY CONTROL

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

.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.

.3 Upon completion of sectional test, undertake group testing.

.4 Check out complete system for operational sequencing.

3.3 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Lump Sum

1.2 REFERENCES

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

- .1 ASTM C117, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D422-63, Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ;) (600 kN-m/m ;).
- .5 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ;) (2,700 kN-m/m ;).
- .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A3001, Cementitious Materials for Use in Concrete.
- .2 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 DEFINITIONS

.1 Excavation classes: one class of excavation will be recognized: common excavation.

- .1 Common excavation: excavation of materials of whatever nature from construction of the Aboveground Storage Tank pad, bollards, fencing, and trenches.

.2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

1.5 EXISTING CONDITIONS

.1 Buried services:

.1 Before commencing work verify location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.5 Confirm locations of buried utilities by careful test excavations.

.6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.

.8 Record location of maintained, re-routed and abandoned underground lines and provide a drawing showing underground lines to the Owner.

.9 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, 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

Part 2 Products

2.1 MATERIALS

.1 Type 1 fill:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.3 Table:

Sieve Designation	% Passing
	Type 1
75 mm	
50 mm	
37.5 mm	
25 mm	
19 mm	75 – 100
12.5 mm	60 – 90
9.5 mm	40 – 70
4.75 mm	27 – 55
2.00 mm	16 - 42
0.425 mm	8 – 30
0.180 mm	
0.075 mm	5 – 20

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

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

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

3.3 PREPARATION/PROTECTION

.1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.2 Keep excavations clean and free of standing water, ice, snow, and loose soil.

.3 Protect buried services that are required to remain undisturbed.

3.4 STOCKPILING

.1 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated in the Design Drawings.

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

.3 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.

.4 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.5 Keep excavated and stockpiled materials safe distance away from edge of trench. Excavated soil to be stockpiled in a location on-site to be determined during the start-up meeting with the Owner.

.6 Restrict vehicle operations directly adjacent to open trenches.

.7 Stockpile excavated soil in locations as directed by Departmental Representative.

.8 Dispose of surplus and unsuitable for re-use excavated material in off-site location approved by the Departmental Representative.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter or snow or ice.

.10 Remove unsuitable material from trench bottom including those that extend below required elevations. The Contractor is to provide a subsurface material inspection report stamped and signed by a Professional Engineer registered or licensed in Province of Saskatchewan, Canada.

3.6 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated in Design drawings

.2 Bedding must be dry unfrozen granular material.

3.7 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

- .1 Departmental Representative has approved installations.
- .2 Departmental Representative has approved of construction below finish grade.
- .3 Inspection, testing, approval, and recording location of underground utilities.
- .4 Removal of concrete formwork.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated on Design drawing. Compact each layer to 95% MPD before placing succeeding layer. The Contractor is to provide a backfill compaction report stamped and signed by a Professional Engineer registered or licensed in Province of Saskatchewan, Canada. The backfill compaction report will be submitted to the Departmental Representative for review and approval.

.5 Backfilling around installations:

- .1 Place bedding and surround material as specified elsewhere.
- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading.

3.8 RESTORATION

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

END OF SECTION

Part 1 General

1.1 GENERAL INSTRUCTIONS

.1 All works and materials shall meet the requirements of the standards referenced herein, the General Instructions, and specific requirements outlined in the following sub-sections.

.2 Submit shop drawings of tank and appurtenances for approval by Departmental Representative prior to manufacturing.

Part 2 Products

2.1 MAIN AST

.1 9,100 litre Gasoline (Exact volume may vary with tank manufacturer's standard sizes).

.2 Horizontal cylindrical.

.3 Steel.

.4 Saddles and bands.

.5 CAN/ULC-S601-14 labeled as per standard.

.6 Double-walled with vacuum monitored interstitial space.

.7 As per drawing M101.

.8 Dipsticks and charts to be included with tank (cm).

.9 Gasoline - pressure/vacuum vent 2 oz pressure/½ oz vacuum vent.

.10 Spill fill box as per Detail 5 Drawing M101, c/w lockable hinged lid and drain valve.

.11 25Ø Water Draw-Off with male tight fill connector, dust cap and drop pipe.

.12 50Ø Dipping port with male tight fill connector and dust cap.

.13 Gasoline - High Pressure Overfill Prevention Valve c/w 50Ø tight fill connection.

.14 Overfill Prevention Valve shall be set to shut off at 95% of tank capacity.

.15 Provide clock gauge with metric face plate (cm), c/w integral high level alarm and annunciator.

.16 Surface preparation: - SSPC - SP 10, Commercial Blast Clean.

.17 Coatings: 1 coat Hi-Build Epoxy primer (5-6 mils dft) to SSPC-PA2 and Polyurethane (2-3 mils dft) finish surface coat, colour "WHITE".

.18 A 1/8" thick neoprene gasket shall be installed between the outer tank shell and the support saddles and restraining bands to prevent coating damage.

.19 Two grounding tabs shall be provided (one on each end of the tank shell). Each tab shall have a 15 mmØ (1/2") hole for attachment of cable lugs to tank.

.20 Lifting lugs shall be provided such that the tank and support can be lifted together as a unit.

.21 The tank shall be marked in conformance with CPPI as well as requirements of the National Fire Code and ULC CAN-S601. The shell of the tank (on the fill piping side) and each end shall be stenciled (in 100mm tall black letters):

GASOLINE
CAPACITY 9,100 LITRES
MAXIMUM FILL 8,190 LITRES
SAFE FILL HEIGHT _____*

*Tank level at "Safe Fill Height" shall equal 90% of volumetric capacity of the tank in centimeters.

.22 Angle uprights on tank provided to suit pipe support.

.23 Access step shall be provided for the tank as per drawing M101. Stair treads shall be galvanized and bolted to stringers. Stringers and other structural steel elements shall be prepared and coated as per the tank specification. The step shall conform to the National Building Code and Saskatchewan Workers' Compensation Board (WCB) standards in all respects.

Part 3 Execution

3.1 TANK MANUFACTURING AND INSTALLATION SPECIFICATIONS

.1 This tank shall be delivered to the Sandy Bay RCMP site - Sandy Bay Avenue, Sandy Bay, SK S0P 0G0.

.2 Tank to be installed by the Contractor.

3.2 CONDITION OF SERVICE

.1 For gasoline fuel dispensing.

.2 Environment is Northern Saskatchewan weather conditions.

3.2 TANK MANUFACTURING CODES AND STANDARDS

.1 The tanks shall be manufactured to Underwriters Laboratories of Canada (ULC) Standard S601-14 "Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids".

.2 The tanks shall be double wall with vacuum monitoring of the interstitial space to meet ULC Standard S601-14 requirements for double wall tanks.

.3 The tank will be fitted with manual fuelling equipment to meet ULC/ORD-C142.19 "Spill Containment Devices for Aboveground Flammable and Combustible Liquid Storage Tanks".

.4 The Steel Structure Painting Council Standards for Surface Preparation and Paint Applications as noted in this specification.

.5 The tanks shall be supported on saddles, seismic restraint brackets, and bolts to meet the requirements of the National Building Code of Canada. Shop drawings shall be delivered to the Departmental Representative prior to start of fabrication.

.6 Tank appurtenances to be supplied with the tank shall meet the requirements of CCME PN 1326, CEPA, NFCC, NBC, CSA, CEC, and B31.3, latest editions.

.7 1 – Wood gauging stick (calibrated in cm) c/w plastic coated gauge chart and strike plate in tank bottom.

.8 Grounding lugs as required.

.9 Tanks to have ULC and manufacturer's labels affixed to the shell plate.

3.3 TANK INSTALLATION

.1 The tank shall be visually inspected over the entire surface before and after shipping.

Special attention should be given to locations of shipping cradles and attachment straps. If any damage is present the tank shall not be installed until inspected by the Departmental Representative and repaired if necessary by the manufacturer's representative.

.2 Inspect for the following defects before and after shipping:

.3 Visible damage to shell plate or nozzles; i.e. dents, appurtenance nozzles out of alignment, stress bends or deformation of shell plates and/or saddle supports and paint scrapes.

.4 Read and record vacuum gauge reading before off-loading including an annotation of the ambient temperature at the time of the readings. Record the vacuum gauge readings after the tanks are set on concrete slab. The Contractor will be provided with the vacuum gauge readings for the tank(s) recorded before shipping and the two readings shall be compared before off-loading at the site. Any readings varying more than 2" Hg less than the recorded vacuum at the plant site must be reported immediately to the Manufacturer before off-loading the tank.

.3 The contractor shall immediately report all other defects to the Departmental Representative. The report of damage to the Departmental Representative shall include photographs signed and dated by the contractor's on-site foreman.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 211.1, Rigid Types EBI and DB2/ES2 PVC Conduit.

.2 CSA C22.2 No. 211.3, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings (Bi-national standard, with UL 1684).

1.2 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.

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

Part 2 PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC duct: to CSA C22.2 No. 211.1, Type DB2/ES2, with fabricated fittings, for direct burial, Trade size 5 or 6. Nominal length: 3 m plus or minus 12 mm.

.2 Rigid PVC split ducts.

.3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.

.4 Rigid PVC 90 degrees and 45 degrees bends.

.5 Rigid PVC 5 degrees angle couplings.

.6 Expansion joints as required.

2.2 SOLVENT WELD COMPOUND

.1 Solvent cement for PVC duct joints.

2.3 FIBREGLASS DUCTS

.1 Fibreglass reinforced thermoset duct: to CSA C22.2 No. 211.3, Trade size 5 or 6, watertight type.

.2 Couplings, reducers, plugs, caps, adaptors, and supports to make complete installation.

.3 Expansion joints as required.

2.4 PLASTIC POLYETHYLENE PIPE

.1 Rigid plastic polyethylene pipe with approved couplings and fittings required to make complete installation.

2.5 CABLE PULLING EQUIPMENT

.1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.6 MARKERS

.1 Concrete type cable markers: as indicated, with words: "Cable", "Joint" or "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

.2 Cedar post type markers: 89 x 89mm square, 1.5 m long, pressure treated with clear, copper napthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing duct.

.1 Nameplate: aluminum anodized 89 x 125 mm, 1.5mm thick mounted on cedar post with mylar label 0.125 mm thick with words "Cable" "Joint" or "Conduit" with arrows to indicate change in direction.

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.

.2 Clean inside of ducts before laying.

.3 Ensure full, even support every 1.5 m throughout duct length.

.4 Slope ducts with 1 to 400 minimum slope.

.5 During construction, cap ends of ducts to prevent entrance of foreign materials.

.6 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 matter.

.1 Pull stiff bristle brush through each duct immediately before pulling-in cables.

.7 In each duct install pull rope continuous throughout each duct run with 3m spare rope at each end.

.8 Install markers as required.

END OF SECTION