Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises of Gate and Fence Repair and Replacement at the Saskatchewan Penitentiary in Prince Albert, Saskatchewan; and further identified as Project No. R.058018.001.

1.2 CONTRACT METHOD

.1 Construct Work under single stipulated price contract.

1.3 WORK OF THIS CONTRACT AND EXISTING SERVICES

.1 Ensure that the work of this contract including the provision of new fence post piles and sally port gate grade beam foundations does not accidentally interfere with existing underground services.

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

.3 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

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

.5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

1.4 USER OCCUPANCY

.1 User will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with User in scheduling operations to minimize conflict and to facilitate User Occupancy.

1.5 WORK SEQUENCE

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

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

.3 Maintain fire access/control.

1.6 CONTRACTOR USE OF PREMISES

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

.1 User occupancy.

.2 Co-ordinate use of premises under direction of Departmental Representative.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

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

.6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.7 EXISTING SERVICES - TEMPORARY MEASURES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.

.3 Provide alternative routes for pedestrian and vehicular traffic.

.4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.5 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

.6 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

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

1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

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 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 and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

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

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

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

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

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.4 EXISTING SERVICES

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

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

.3 Provide for personnel and vehicular traffic.

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

1.5 SPECIAL REQUIREMENTS

.1 Refer to Section 01 35 13 – Security Requirements.

1.6 SMOKING RESTRICTIONS

.1 Refer to Section 01 35 13 – Security Requirements.

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 APPOINTMENT AND PAYMENT

.1 Departmental Representative will appoint and pay for services of testing laboratory except as follows:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under supervision of Departmental Representative.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.2 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

- .1 Provide access to Work for inspection and testing.
- .2 Facilitate inspections and tests.
- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

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

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

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 throughout the progress of the work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting seven days in advance of meeting date to 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 three days after meetings and transmit to meeting participants and affected parties not in attendance.

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

1.2 PRECONSTRUCTION MEETING

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

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

.3 Establish time and location of meeting and notify parties concerned minimum 7 days before meeting.

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

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified equipment.

.6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

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

.8 Owner provided products.

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

.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.12 Monthly progress claims, administrative procedures, photographs, hold backs.

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work, schedule progress meetings every two weeks.

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

.3 Notify parties minimum 7 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

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

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

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

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

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

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

.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.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

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

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

.1 Interim Certificate (Substantial Completion) within six months of Award of Contract date.

1.5 MASTER PLAN

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

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

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

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

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

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

.1 Award.
.2 Shop Drawings, Samples.
.3 Mobilization.
.4 Excavation.
.5 Backfill.
.6 Foundations.
.7 Concrete.
.8 Masonry.
.9 Structural Steel.
.10 Electrical.
.11 Testing and Commissioning.
.12 Supplied equipment long delivery items.

1.7 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.

1.8 PROJECT MEETINGS

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

.2 Weather related delays with their remedial measures will be discussed and negotiated.

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

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

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

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

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

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

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Saskatchewan.

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

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

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

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

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

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

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

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

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

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

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

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

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

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

.14 Submit electronic copies of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

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

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

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

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

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative 's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

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

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

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, fine resolution monthly with progress statement.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 2 locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: weekly and as directed by Departmental Representative

1.6 CERTIFICATES AND TRANSCRIPTS

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

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 PURPOSE

.1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

1.2 DEFINITIONS

.1 "Contraband" means:

.1 an intoxicant, including alcoholic beverages, drugs and narcotics,

.2 a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,

.3 an explosive or a bomb or a component thereof,

.4 currency over $25, when possessed by an inmate without prior authorization, and

.5 any item not described in paragraphs (1) to (4) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization

.2 “Unauthorized Smoking Items” means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing or snuffing tobacco, cigarette making machines, matches and lighters.

.3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.4 "CSC" means Correctional Service Canada.

.5 "Construction employees" means persons working for the general Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.

.6 “Departmental Representative” means the Public Works and Government Services Canada (PWGSC) or the Correctional Service Canada (CSC) project manager depending on project.

.7 "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates.

.8 "Construction zone" means the area as shown on the contract drawings where the contractor will be allowed to work. This area may or may not be isolated from the security area of the institution.

1.3 PRELIMINARY PROCEEDINGS

.1 Prior to the commencement of work, the Contractor will meet with the Departmental Representative to:

.1 Discuss the nature and extent of all activities involved in the Project.

.2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.

.2 The Contractor will:

.1 Ensure that all construction employees are aware of the CSC security requirements.

.2 Ensure that a copy of the CSC security requirements is always prominently on display at the job site.

.3 Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees.

1.4 CONSTRUCTION EMPLOYEES

.1 Submit to the Departmental Representative a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee. (*Institutional Access CPIC Clearance Request* form CSC/SCC 1279).

.2 Allow two (2) weeks for processing of security clearances. Construction employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC institutions are not valid at the institution where the project is taking place.

.3 The Departmental Representative requires that facial photographs be taken of construction employees and these photographs be displayed at appropriate locations in the institution or in an electronic database for identification purposes. The Departmental Representative requires that Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the construction employees clothing at all time while employees are at the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:

.1 appear to be under the influence of alcohol, drugs or narcotics.

.2 behave in an unusual or disorderly manner.

.3 are in possession of contraband.

1.5 VEHICLES

.1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.

.2 The Departmental Representative may limit at any time the number and type of vehicles allowed within the Institution.

.3 Drivers of delivery vehicles for material required by the project shall require security clearances and must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or Commissionaires while in the Institution.

.4 If the Departmental Representative permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter must be locked when not in use.

1.6 PARKING

.1 The parking area(s) to be used by construction employees will be designated by the Departmental Representative. Parking in other locations will be prohibited and vehicles may be subject to removal.

1.7 SHIPMENTS

.1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the institution's own shipments. The Contractor must have his own construction employees on site to receive any deliveries or shipments. CSC staff will NOT accept receipt of deliveries or shipments of any material equipment or tools.

1.8 TELEPHONES

.1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the institution unless prior approval of the Departmental Representative is received.

.2 The Departmental Representative will ensure that approved telephones, Facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.

.3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the perimeter of the Institution unless approved by the Departmental Representative. If wireless cellular telephones are permitted, the user will not permit their use by any inmate. Cellular telephones approved by the Departmental Representative must be signed in and out of the institution.

.4 The Departmental Representative may approve and limit the use of two-way radios.

1.9 WORK HOURS

.1 Work hours within the Institution are: Monday to Friday 7:30 a.m. to 6:00 p.m.

.2 Work will not be permitted during weekends and statutory holidays without the permission of the Departmental Representative. A minimum of three (3) days advance notice will be required to obtain the required permission. In case of emergencies or other

special circumstances, this advance notice may be waved by the Departmental Representative.

1.10 OVERTIME WORK

.1 No overtime work will be allowed without permission of the Departmental Representative. Give a minimum twenty-four (24) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such the completion of a concrete pour or work to make the construction safe and secure, the contractor shall advise the Departmental Representative as soon as this condition is known and follow the directions given by the Departmental Representative. Costs to Canada for such events may be attributed to the contractor.

.2 When overtime work, weekend statutory holiday work is required and approved by the Departmental Representative, extra staff members may be posted by the Departmental Representative or his designate, to maintain the security surveillance. The actual cost of this extra staff may be attributed to the contractor.

1.11 TOOLS AND EQUIPMENT

.1 Maintain on site a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required.

.2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.

.3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.

.4 Store all tools and equipment in approved secure locations.

.5 Lock all toolboxes when not in use. Keys to remain in the possession of the construction employees of the Contractor.

.6 Scaffolding shall be secured and locked when not erected and when erected, shall be secured in a manner agreed upon with the Departmental Representative.

.7 All missing or lost tools or equipment shall be reported immediately to the Departmental Representative.

.8 The Departmental Representative will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:

.1 At the beginning and conclusion of every construction project.

.2 Weekly, when the construction project extends longer than a one week period.

.9 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Departmental Representative at the end of each day. All power “shot”, Ram-set, Hilti or any other power-driven tool must have all cartridges accounted for including those which have been

used. The correct count of these tools must be verified entering and leaving the institution at the beginning and end of each day. All broken blades and tools must be accounted for and broken tools are not to be thrown away. Particular attention must be given to power driven tools, files, saw blades, rod saws, wire, rope and ladders. Tool kits must be locked when the area is unattended.

.10 If propane or natural gas is used for heating the construction, the institution will require that an employee of the contractor supervise the construction site during non-working hours.

1.12 SECURITY HARDWARE

.1 Turn over all removed security hardware to the Departmental Representative of the Institution for disposal or for safekeeping until required for re-installation.

1.13 PRESCRIPTION DRUGS

.1 Employees of the Contractor who are required to take prescription drugs during the workday shall obtain approval of the Departmental Representative to bring a one-day supply only into the Institution.

1.14 SMOKING RESTRICTIONS

.1 Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.

.3 Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Departmental Representative.

1.15 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.

.2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Departmental Representative.

.3 Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.

.4 Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

1.16 SEARCHES

.1 All vehicles and persons entering institutional property may be subject to search.

.2 When the Departmental Representative suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband or unauthorized items, he may order that person to be searched.

.3 All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.

1.17 ACCESS TO AND REMOVAL FROM INSTITUTIONAL PROPERTY

.1 Construction personnel and commercial vehicles will not be admitted to the institution after normal working hours, unless approved by the Departmental Representative.

1.18 MOVEMENT OF VEHICLES

.1 Escorted commercial vehicles will be allowed to enter or leave the institution through the vehicle access gate during the following hours:

.1 07:30 a.m. to 11:00 a.m.

.2 1:00 p.m. to 3:30 p.m.

Construction vehicles shall not leave the Institution until an inmate count is completed.

.2 The contractor shall advise the Departmental Representative twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

.3 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or Commissionaires working under the authority of the Departmental Representative.

.4 Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.

.5 Vehicles shall be refused access to institutional property if, in the opinion of the Departmental Representative, they contain any article which may jeopardize the security of the institution.

.6 Private vehicles of construction employees will not be allowed within the security perimeter of medium or maximum security institutions without the authorization of the Departmental Representative. Contractor’s employees will park their vehicles in a designated area outside the perimeter of the institution.

.7 With the approval of the Departmental Representative, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Departmental Representative may require that the equipment be secured with a chain and padlock to another fixed object.

1.19 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.1 Subject to the requirements of good security, the Departmental Representative will permit the Contractor and his employees as much freedom of action and movement as is possible.

.2 However, notwithstanding paragraph above, the Departmental Representative may:

.1 Prohibit or restrict access to any part of the institution.

.2 Require that in certain areas of the institution, either during the entire construction project or at certain intervals, construction employees only be allowed access when escorted by a member of the CSC security staff or a commissionaire.

.3 During the lunch and coffee/health breaks, all construction employees will remain within the construction site. Construction employees are not permitted to eat in the officer's lounge or the dining room of the institution.

1.20 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project.

1.21 STOPPAGE OF WORK

.1 The Departmental Representative may order at any time that the contractor, his employees, sub-contractors and their employees to not enter or to leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor shall note the name of the CSC staff member giving this instruction, the time of the request and obey the order as quickly as possible.

.2 The contractor shall advise the Departmental Representative of this interruption of the work within 24 hours.

1.22 CONTACT WITH INMATES

.1 Unless specifically authorized, the contractor is not encouraged to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any construction employee doing any of the above without permission will be removed from the site and his security clearance revoked.

.2 It is to be noted that cameras are not allowed on CSC property except if required for photographic history of the project. In this case, the contractor will be asked to use a designated memory card for the project.

.3 Notwithstanding the above paragraph, if the Departmental Representative approves of the usage of cameras, it is strictly forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract.

1.23 COMPLETION OF CONSTRUCTION PROJECT

.1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

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 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit 2 copies 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, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

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

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

.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 MEETINGS

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

1.6 REGULATORY REQUIREMENTS

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

1.7 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.

1.8 RESPONSIBILITY

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

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

1.9 COMPLIANCE REQUIREMENTS

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

1.10 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.

1.11 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.

1.12 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.

1.13 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

1.14 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.15 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 FIRES

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

1.2 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

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

1.3 DRAINAGE

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

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

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

1.4 SITE CLEARING

.1 Minimize stripping of topsoil and vegetation.

1.5 POLLUTION CONTROL

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

.2 Control emissions from equipment and plant to local authorities emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

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

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 AND CODES

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

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.

.2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.

.3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Refer to Section 01 35 13 – Security Requirements.

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

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

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

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

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

1.2 INDEPENDENT INSPECTION AGENCIES

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

.2 Provide equipment required for executing inspection and testing by appointed agencies.

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

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

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

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

1.4 PROCEDURES

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

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

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

1.5 REJECTED WORK

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

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

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

1.6 REPORTS

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

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

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

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

1.8 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.9 MILL TESTS

.1 Submit mill test certificates as required of 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 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 DEWATERING

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

1.3 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use in accordance with governing regulations and ordinances, from a designated existing source.

.2 Provide temporary connections and run all temporary piping or hoses to job locations requiring water service. Disconnect and remove upon completion of Work.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

1.5 TEMPORARY POWER AND LIGHT

.1 The Departmental Representative will provide and pay for temporary power required during construction from a designated existing source for temporary lighting and operating power tools, to a maximum of 230 volts 30 amps, in accordance with governing regulations and ordinances.

.2 The Departmental Representative is not responsible for interruptions to temporary power which may occur.

.3 Provide all connections and power cords, from the designated existing source.

.4 Temporary power shall not be used for welding. Use self-generator units for all welding power.

.5 If Departmental Representative supplied power is insufficient, provide and pay for temporary power required during construction for temporary lighting and operating power tools, in accordance with governing regulations and ordinances.

.6 Provide centrally located power panels for the use of all Subcontractors. Subcontractors shall provide their own extension cables c/w suitable fittings.

.7 Provide and be responsible for necessary switching, fusing, wiring and connections in accordance with the Canadian Electrical Code.

.8 Temporary power for electric cranes (where applicable) and other equipment requiring a supply in excess of capacities available, is the responsibility of the Contractor.

.9 Provide and maintain temporary lighting throughout the project. Provide a level of illumination on all floors and stairs of not less than 15 foot candles. Provide higher levels of illumination where required by specific sections of the specifications, to control quality of workmanship.

.10 When work is performed at night or where daylight is obscured, provide artificial light sufficient to perform work properly and to permit thorough inspection.

.11 Permanent electrical power and lighting system may be used for construction requirements provided no damage occurs or guarantees affected. Obtain Departmental Representative's approval before using permanent electrical power and lighting system. Pay all costs for use of permanent electrical power and lighting system during construction, until Substantial Performance of the Work. Burnt out lamps shall be replaced with new lamps, prior to acceptance for substantial performance.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax and data hook up, lines, and equipment necessary for own use.

.2 Cellular telephones are **not** permitted on site.

1.7 FIRE PROTECTION

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

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

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 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)

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

.2 CSA-0121-M1978(R2003), Douglas Fir Plywood.

.3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.

.4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

.5 CAN/CSA-A277(R2008) and modular units certified under CSA-A277, Procedure for Factory Certification of Buildings

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Coordinate, confirm and obtain approval for all facilities with Departmental Representative prior to installation.

.2 Refer to drawings for proposed location of installations.

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

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

.5 Indicate use of supplemental or other staging area.

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

.7 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, platforms and temporary stairs.

1.5 HOISTING

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.

.2 Hoists and cranes shall be operated by qualified operator.

1.6 SITE STORAGE/LOADING

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

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

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site in an area as directed by the Departmental Representative provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Make good damage resulting from Contractors' use of roads.

.4 Refer to drawings for location of Contractor parking area.

1.8 SECURITY

.1 Refer to Section 01 35 13 - Security Requirements.

1.9 OFFICES

.1 Provide office heated to 22 ^{o}C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors may provide their own offices as necessary.

.4 Locate offices where directed by the Departmental Representative.

.5 Refer to drawings for location of offices.

1.10 EQUIPMENT, TOOL AND MATERIAL STORAGE

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

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

.3 Refer to Section 01 35 13 - Security Requirements.

1.11 SANITARY FACILITIES

.1 During Construction Phases, provide sanitary facilities for work force in accordance with governing regulations and ordinances.

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

.3 Locate sanitary facilities as directed by the Departmental Representative.

1.12 CONSTRUCTION SIGNAGE

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

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

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

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

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

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

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

.13 Provide snow removal during period of Work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.14 CLEAN-UP

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

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.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.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide as required by governing authorities.

1.3 WEATHER ENCLOSURES

.1 Enclose exterior work for temporary heat.

.2 Design enclosures to withstand wind pressure and snow loading.

1.4 DUST TIGHT SCREENS

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

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

1.5 ACCESS TO SITE

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

1.6 FIRE ROUTES

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

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

1.8 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.9 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 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 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

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

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

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.2 QUALITY

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended, except where salvaged existing products are specifically noted. If requested, furnish evidence as to type, source and quality of products provided.

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

.3 Examine existing materials designated for reuse in this Contract. If materials designated for reuse are unfit or damaged, replace with new material.

.4 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

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

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

1.3 STORAGE, HANDLING AND PROTECTION

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

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

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

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

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

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

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

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.4 TRANSPORTATION

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

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

1.5 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.6 QUALITY OF WORK

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

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

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

1.7 CO-ORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

1.8 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.9 REMEDIAL WORK

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

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

1.10 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

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

1.11 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.13 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.14 EXISTING UTILITIES

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 EXISTING SERVICES

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

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.2 LOCATION OF EQUIPMENT AND FIXTURES

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

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

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

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

1.3 SUBSURFACE CONDITIONS

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

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

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 Individual product Sections: cutting and patching incidental to work of section. Advance notification to other sections required.

1.2 SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.
.2 Integrity of weather-exposed or moisture-resistant elements.
.3 Efficiency, maintenance, or safety of any operational element.
.4 Visual qualities of sight-exposed elements.
.5 Work of Departmental Representative or separate contractor.

.3 Include in request:

.1 Identification of Project.
.2 Location and description of affected Work.
.3 Statement on necessity for cutting or alteration.
.4 Description of proposed Work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Effect on Work of Departmental Representative or separate contractor.
.7 Written permission of affected separate contractor.
.8 Date and time work will be executed.

1.3 MATERIALS

.1 Required for original installation.

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

1.4 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

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

1.5 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.10 Restore work with new products in accordance with requirements of Contract Documents.

.11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with fire-stopping material, full thickness of the construction element.

.13 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

.14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

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 PROJECT CLEANLINESS

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

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

.3 Clear snow and ice from access to work area, bank/pile snow in designated areas only.

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

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

.6 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

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

.8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

.10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

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 occupancy.

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

.4 Remove waste products and debris including that caused by Departmental Representative or other Contractors.

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

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

.7 Vacuum clean and dust building interiors.

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

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

.10 Remove dirt and other disfiguration from exterior surfaces.

.11 Sweep and wash clean paved areas.

.12 Remove snow and ice from access to work area.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

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

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

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

.4 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.5 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

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

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

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

1.2 DOCUMENTS

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

.1 Material Source Separation Plan.

1.3 SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:

.1 Submit 2 copies of Materials Source Separation Program (MSSP) description.

1.4 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

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

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

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

.4 Provide containers to deposit reusable and recyclable materials.

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

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

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

.1 Transport to approved and authorized recycling facility.

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

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

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

1.5 WASTE PROCESSING SITES

.1 Province of: Saskatchewan.

.1 Name: Environment and Resource Management.

.2 Telephone:(306) 787-2700.

.3 Fax: (306) 787-3941.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

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

.6 Separate and store materials produced during dismantling of structures in designated areas.

.7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.

.3 Provide waybills for separated materials.

1.7 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins.

.2 Waste type of each bin.

.3 Total tonnage generated.

.4 Tonnage reused or recycled.

.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

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

1.8 USE OF SITE AND FACILITIES

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

.2 Provide temporary security measures approved by Departmental Representative.

1.9 SCHEDULING

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 APPLICATION

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

3.2 CLEANING

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

.2 Clean-up work area as work progresses.

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

3.3 DIVERSION OF MATERIALS

.1 The diversion of waste materials from landfills is highly encouraged. Separate, recyclable and reusable materials where possible.

.2 On-site sale of salvaged, recovered, reusable, or recyclable materials is not permitted.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

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

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

.2 Request Departmental Representative inspection.

.2 Departmental Representative Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.

.2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.2 FINAL CLEANING

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

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

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

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 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Copy will be returned after final inspection, with Departmental Representative's comments.

.4 Revise content of documents as required prior to final submittal.

.5 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four (4) final copies of operating and maintenance manuals in English.

.6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.7 If requested, furnish evidence as to type, source and quality of products provided.

.8 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.9 Pay costs of transportation.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review manufacturer's installation instructions and warranty requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

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

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

1.3 FORMAT

.1 Organize data in the form of an instructional manual.

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

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

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

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

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

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

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

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

- .1 date of submission; names,
- .2 addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties;
- .3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:

- .1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

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

.4 Drawings: supplement product data to illustrate relations of component parts of equipment

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

.6 Training: Refer to Section 01 91 41 - Commissioning: Training.

1.5 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

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

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

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

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

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

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

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

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

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

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

1.7 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

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

.3 Include installed colour coded wiring diagrams.

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

.12 Include test reports as specified in Section 01 91 13- General Commissioning (Cx) Requirements.

.13 Additional requirements: As specified in individual specification sections.

1.8 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

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

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

.4 Additional Requirements: as specified in individual specifications sections.

1.9 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.10 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.11 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

1.12 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

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

1.13 WARRANTIES AND BONDS

.1 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

.2 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.3 Respond in timely manner to oral or written notification of required construction warranty repair 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 SUMMARY

.1 Acronyms:

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

.2 BMM - Building Management Manual.

.3 Cx - Commissioning.

.4 O&M - Operation and Maintenance.

.5 PI - Product Information.

.6 PV - Performance Verification.

1.2 GENERAL

.1 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 BMM.

.3 Effectively train 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. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.

.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.

1.3 COMMISSIONING OVERVIEW

.1 Section 01 91 31 - Commissioning (Cx) Plan.

.2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) Plan.

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

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

.5 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 includes transfer of critical knowledge to facility operational personnel.

.6 Departmental Representative will issue Interim Acceptance Certificate when:

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

.2 Equipment, components, systems and integrated systems have been fully commissioned and are functional as per the design intent within the context of the Owners'Requirements.

.3 Final O&M and Training Manual received, reviewed and approved by the Departmental Representative for suitability.

.4 Completed training session(s) with operational and maintenance staff.

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 unfunctional 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. Above costs to be in form of progress payment reductions or hold-back assessments.

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, systems is complete.

.3 Fully understand Cx requirements and procedures.

.4 Have Cx documentation shelf-ready.

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

.6 Have Cx schedules up-to-date.

.7 Ensure systems have been cleaned thoroughly.

.8 Ensure "As-Built" system schematics are available.

.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 testing and obtain clarification.

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

1.7 SUBMITTALS

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

.1 Submit no later than 4 weeks after award of Contract:

.1 Name of Contractor's Cx agent.

.2 Draft Cx documentation.

.3 Preliminary Cx schedule.

.2 Request in writing to Departmental Representative for changes to submittals and obtain written approval.

.3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.

.4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.8 COMMISSIONING DOCUMENTATION

.1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.

.2 Departmental Representative to review and approve Cx documentation.

.3 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 (GANTT) 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 COMMISSIONING MEETINGS

.1 Chair, prepare agenda and issue minutes.

.2 Convene Cx meetings following project meetings: Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart and as specified herein.

.3 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

.4 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.5 At 60% construction completion stage. Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart. Departmental Representative to call a separate Cx scope meeting to review progress and prepare for Cx. Issues at meeting to include:

.1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.

.2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.6 Thereafter Cx meetings to be held until project completion and as required during functional testing period.

.7 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.

.8 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.11 STARTING AND TESTING

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

1.12 WITNESSING OF TESTING

.1 Provide 14 days notice prior to commencement.

.2 Departmental Representative to witness of testing.

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

1.13 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: manufacturer to:

.1 Coordinate time and location of testing.

.2 Provide testing documentation for approval by Departmental Representative.

.3 Arrange for Departmental Representative to witness tests.

.4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.

.2 Obtain manufacturers installation and operations instructions prior to testing of components, equipment and systems and review with Departmental Representative.

.1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.

.2 Modify procedures detrimental to equipment performance and review same with manufacturer before testing.

.3 Integrity of warranties:

.1 Use manufacturer's trained testing personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.

.2 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:

.1 Experienced in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

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

.2 Conduct testing in following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.

.2 Visual inspection of quality of installation.

.2 Operational testing: document equipment performance.

.3 System PV: include repetition of tests after correcting deficiencies.

.4 Post-substantial performance verification: to include fine-tuning.

.3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document required tests on approved PV forms.

1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 Operate and maintain equipment and systems as directed by equipment/system manufacturer.

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

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

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.16 TEST RESULTS

.1 If PV produce unacceptable results, repair, replace or repeat specified PV procedures until acceptable results are achieved.

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

1.17 START OF COMMISSIONING

.1 Notify Departmental Representative at least 21 days prior to start of Cx.

.2 Start Cx after elements of project affecting performance verification of systems have been completed.

1.18 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 2-way radios.

.2 Ladders.

.3 Equipment as required to complete work.

1.19 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under actual 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.

1.20 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.21 AUTHORITIES HAVING JURISDICTION

.1 Where specified 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.

1.22 COMMISSIONING CONSTRAINTS

.1 Since access into secure or sensitive areas will be very difficult after occupancy, it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems in these areas before issuance of the Interim Certificate.

1.23 EXTENT OF VERIFICATION

.1 General:

.1 Provide manpower and instrumentation to verify up to 100 % of reported results, unless specified otherwise in other sections.

.2 Number and location to be at discretion of Departmental Representative.

.3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.

.4 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.

.5 Perform additional commissioning until results are acceptable to Departmental Representative.

1.24 REPEAT VERIFICATIONS

.1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:

.1 Verification of reported results fail to receive Departmental Representative's approval.

.2 Repetition of second verification again fails to receive approval.

.3 Departmental Representative deems Contractor's request for second verification was premature.

1.25 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.

1.26 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during 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.

1.27 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.

1.28 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.

1.29 TRAINING

.1 In accordance with Section 01 91 41 - Commissioning (Cx) - Training.

1.30 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.31 OCCUPANCY

.1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.32 PERFORMANCE VERIFICATION TOLERANCES

.1 Application tolerances:

.1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.

.2 Instrument accuracy tolerances:

.1 To be of higher order of magnitude than equipment or system being tested.

.3 Measurement tolerances during verification:

.1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.33 OWNER'S PERFORMANCE TESTING

.1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified 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 REFERENCES

.1 CSA International

.1 CSA Z320-11 (R2016), Building Commissioning Standard**.**

1.2 GENERAL

.1 Provide a fully functional facility:

.1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.

.2 Facility user and O&M personnel have been fully trained in aspects of installed systems.

.3 Optimized life cycle costs.

.4 Complete documentation relating to installed equipment and systems.

.2 Term "Cx" in this section means "Commissioning".

.3 Use this Cx Plan as master planning document for Cx:

.1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.

.2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.

.3 Sets out deliverables relating to O&M, process and administration of Cx.

.4 Describes process of verification of how built works meet Owner/Investor's design requirements.

.5 Produces a complete functional system prior to issuance of Certificate of Occupancy.

.6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:

.1 Overview of Cx.

.2 General description of elements that make up Cx Plan.

.3 Process and methodology for successful Cx.

.4 Acronyms:

.1 Cx - Commissioning.

.2 BMM - Building Management Manual.

.3 MSDS - Material Safety Data Sheets.

.4 PI - Product Information.

.5 PV - Performance Verification.

.6 WHMIS - Workplace Hazardous Materials Information System.

.5 Commissioning terms used in this Section:

.1 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.3 DEVELOPMENT OF 100% CX PLAN

.1 Contractor responsible to update and coordinate a CX plan.

.2 Cx Plan to be 95% completed before added into Project Specifications.

.3 Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:

.1 Approved shop drawings and product data.
.2 Approved changes to contract.
.3 Contractor's project schedule.
.4 Cx schedule.
.5 Contractor's, sub-contractor's, suppliers' requirements.
.6 Project construction team's and Cx team's requirements.

.4 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.4 REFINEMENT OF CX PLAN

.1 During construction phase, revise, refine and update Cx Plan to include:

.1 Changes resulting from Client program modifications.
.2 Approved design and construction changes.

.2 Revise, refine and update every 6 weeks during construction phase. At each revision, indicate revision number and date.

.3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.

.4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.5 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

.1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.

.2 Project Manager will select Cx Team consisting of following members:

.1 PWGSC Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
.2 PWGSC Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project.
.3 Departmental Representative is responsible for:
.1 Review of Cx documentation from operational perspective.
.2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.

.3 Protection of health, safety and comfort of occupants and O&M personnel.

.4 Monitoring of Cx activities, training, development of Cx documentation.

.5 Work closely with members of Cx Team.

.6 Monitoring operations Cx activities.

.7 Witnessing, certifying accuracy of reported results.

.8 Witnessing and certifying tests.

.9 Reviewing final Cx Plan.

.10 Performing verification of performance of installed systems and equipment.

.11 Reviewing Training Plan.

.4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:

.1 Testing.

.2 Performance of Cx activities.

.3 Delivery of training and Cx documentation.

.4 Assigning one person as point of contact with Consultant and PWGSC Cx Manager for administrative and coordination purposes.

.5 Contractor's Cx agent implements specified Cx activities including:

.1 Organizing Cx.

.2 Developing BMM.

.3 Demonstrations.

.4 Training.

.5 Testing.

.6 Preparation, submission of test reports.

.6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:

.1 Receiving facility.

.2 Day-To-Day operation and maintenance of facility.

1.6 CX PARTICIPANTS

.1 Employ the following Cx participants to verify performance of equipment and systems:

.1 Installation contractor/subcontractor:

.1 Equipment and systems except as noted.

.2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.

.1 To include performance verification.

.3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.

.4 Specialist Cx agency:

.1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.

.5 Client: responsible for intrusion and access security systems.

.6 Ensure that Cx participant:

.1 Could complete work within scheduled time frame.

.2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:

.1 Modify ventilation rates to meet changes in off-gassing.

.2 Redistribution of electrical services.

.3 Modifications of fire alarm systems.

.7 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

1.7 EXTENT OF CX

.1 Commission electrical systems and equipment:

.1 Low voltage below 750 V:

.1 Low voltage equipment.

.2 Low voltage distribution systems.

.3 Heat trace and de-icing systems.

.4 Vehicle sallyport gates.

1.8 DELIVERABLES RELATING TO O&M PERSPECTIVES

.1 General requirements:

.1 Compile English documentation.

.2 Documentation to be computer-compatible format ready for inputting for data management.

.2 Provide deliverables:

.1 Warranties.

.2 Project record documentation.

.3 Inventory of spare parts, special tools and maintenance materials.

.4 Maintenance Management System (MMS) identification system used.

.5 WHMIS information.

.6 MSDS data sheets.

.7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

.8 Preventive maintenance program.

.9 Standard Operating Procedures (SOP).

.10 Contractor and sub-contractor as-built drawings.

1.9 DELIVERABLES RELATING TO THE CX PROCESS

.1 General:

.1 Testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.

.2 Definitions:

.1 Cx as used in this section includes:

.1 Cx of components, equipment, systems, subsystems, and integrated systems.

.2 Factory inspections and performance verification tests.

.3 Deliverables: provide:

.1 Cx Specifications.

.2 Startup, pre-Cx activities and documentation for systems, and equipment.

.3 Completed installation checklists (ICL).

.4 Completed product information (PI) report forms.

.5 Completed performance verification (PV) report forms.

.6 Results of Performance Verification Tests and Inspections.

.7 Description of Cx activities and documentation.

.8 Description of Cx of integrated systems and documentation.

.9 Tests of following witnessed by PWGSC Design Quality Review Team:

.1 As determined by Departmental Representative.

.10 Tests performed by Departmental Representative.

.11 Training Plans.

.12 Cx Reports.

.13 Prescribed activities during warranty period.

.4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.

.5 Departmental Representative to participate.

1.10 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Items listed in Cx Plan include the following:

.1 Pre-Testing inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.

.2 Approved check lists.

.3 Departmental Representative will monitor some of these pre-testing inspections.

.4 Include completed documentation with Cx report.

.5 Departmental Representative will monitor some of these inspections and tests.

.6 Include completed documentation in Cx report.

1.11 CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Perform Cx using procedures approved by Departmental Representative.

.2 Departmental Representative to monitor Cx activities.

.3 Upon satisfactory completion, prepare Cx Report using approved PV forms.

.4 Departmental Representative to witness, certify reported results.

.5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.12 INSTALLATION CHECK LISTS (ICL)

.1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.13 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.14 PERFORMANCE VERIFICATION (PV) REPORT

.1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.15 DELIVERABLES RELATING TO ADMINISTRATION OF CX

.1 General:

.1 Complete Cx of occupancy, weather and seasonal-sensitive equipment and systems before equipment is turned over to Departmental Representative.

1.16 CX SCHEDULES

.1 Prepare detailed critical path Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:

.1 Milestones, testing, documentation, training and Cx activities of components, equipment.

.2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.

.2 After approval, incorporate Cx Schedule into Construction Schedule.

.3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

1.17 CX REPORTS

.1 Submit reports of tests, witnessed and certified by Departmental Representative to Departmental Representative who will verify reported results.

.2 Include completed and certified PV reports in properly formatted Cx Reports.

.3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

1.18 ACTIVITIES DURING WARRANTY PERIOD

.1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period.

1.19 TESTS TO BE PERFORMED BY OWNER/USER

.1 None is anticipated on this project.

1.20 TRAINING PLANS

.1 Refer to Section 01 91 41 - Commissioning (Cx) - Training.

1.21 FINAL SETTINGS

.1 Upon completion of Cx to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

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 CHECK LISTS

.1 Include the following data:

.1 Product manufacturer's installation instructions and recommended checks.

.2 Special procedures as specified in relevant technical sections.

.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.

.2 Equipment manufacturer's installation check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.

.3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.

.4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.

.5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.2 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.3 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

.2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

1.4 SAMPLES OF COMMISSIONING FORMS

.1 Departmental Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.

.2 Revise items on Commissioning forms to suit project requirements.

.3 Samples of Commissioning forms and a complete index of produced to date are included at the end of this section.

1.5 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

.1 When additional forms are required, but are not available from Departmental Representative develop appropriate verification forms and submit to Departmental Representative for approval prior to use.

.1 Additional commissioning forms to be in same format as provided by Departmental Representative.

1.6 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

.2 Strategy for Use:

.1 Departmental Representative provides Contractor project-specific Commissioning forms with Specification data included.

.2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.

.3 Confirm operation as per design criteria and intent.

.4 Identify variances between design and operation and reasons for variances.

.5 Verify operation in specified normal and emergency modes and under specified load conditions.

.6 Record analytical and substantiating data.

.7 Verify reported results.

.8 Form to bear signatures of recording technician and reviewed and signed off by Departmental Representative.

.9 Submit immediately after tests are performed.

.10 Reported results in true measured SI unit values.

.11 Provide Departmental Representative with originals of completed forms.

.12 Maintain copy on site during start-up, testing and commissioning period.

.13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual in accordance with Section 01 91 51 - Building Management Manual (BMM).

1.7 SYSTEM COMPONENT LIST

.1 Vehicle sallyport gates:

.1 Motor(s)

.2 Control System

.3 Gate field components

.4 Etc.

.2 Heat trace/de-icing systems:

.1 Heat trace wiring

.2 Temperature sensor
.3 De-icing controller
.4 Etc.

.3 Electrical distribution system:
.1 Panelboard(s)
.2 Transformer(s)
.3 Molded case breaker(s)
.4 Conductors.
.5 Etc.

1.8 LANGUAGE

.1 English

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

EQUIPMENT VERIFICATION FORM

PROJECT:_____
DATE: _____
COMPLETED BY:_____
EQUIPMENT I.D. _____

EQUIPMENT DATA:
Manufacturer _____
_____

LOCATION DATA:
Building

Type _____

Area _____

Model Number _____

Floor _____

Serial Number _____

Room _____

NAMEPLATE DATA:

	Specified	**Shop Drawings**	**Installed**	**Verified By**
Voltage / Phase				
Amperage				
HP / KW / KVA				

INSPECTION CHECK LIST:

ID tags	☐	proper clearance	☐	_____	☐
CSA/UL label present	☐	service space	☐	_____	☐
safety labelling	☐	vibr. isolation	☐	_____	☐
clean	☐	proper mounting	☐	_____	☐
not damaged	☐	proper supports	☐	_____	☐
safety guards	☐	wiring complete	☐	_____	☐

SUPPORT DOCUMENTS:

Manufacturer's Report:	PART 4 Y / N / NA	Comments:	
Manufacturer's Certificates:	**Y / N / NA**	Comments:	
Contractor's Start-Up Report:	**Y / N / NA**	Comments:	

Comments:

SIGN-OFFS:

Contractor: _____Date: _____

Engineer:_____ Date: _____

Owner / Rep: _____ Date: _____

SYSTEM PERFORMANCE VERIFICATION FORM

CONDUCTORS

Project: _____

Date: _____

Completed by: _____

1. **Test Pre-Requisites**
   - .1 Equipment Verification Complete [ ]
2. **Testing Procedures**
   - .1 Insulation Resistance Testing
     - .1 Isolate equipment
     - .2 Measure insulation resistance

       Phase A – G _____ ohms
       Phase B - G _____ ohms
       Phase C - G _____ ohms
       Neutral – G _____ ohms
   - .2 Phasing and Voltage Testing
     - .1 Confirm Phasing Connections

       (Phase A, B, C from left to right when facing equipment)

Phase A	Red	[ ]
Phase B	Black	[ ]
Phase C	Blue	[ ]
Neutral	White	[ ]
Ground	Green	[ ]

     - .2 Measure Voltage

Voltage	Phase A – N	_____ volts
Voltage	Phase B – N	_____ volts
Voltage	Phase C – N	_____ volts
Voltage	Phase N – G	_____ volts
Voltage	Phase A – B	_____ volts
Voltage	Phase B – C	_____ volts
Voltage	Phase C – A	_____ volts

   - .3 Load Balance
     - .1 Measure amperage with all loads energized

Phase A	_____ amps
Phase B	_____ amps
Phase C	_____ amps
Neutral	_____ amps

SYSTEM PERFORMANCE VERIFICATION FORM

600 – 120/208V TRANSFORMER

Project: _____

Date: _____

Completed by: _____

1. **Test Pre-Requisites**

.1 Equipment Verification Complete [ ]

2. **Testing Procedures**

.1 Insulation Resistance Testing

.1 Isolate equipment

.2 Measure insulation resistance

Phase A – G _____ ohms

Phase B - G _____ ohms

Phase C - G _____ ohms

Neutral – G _____ ohms

.2 Phasing and Voltage Testing

.1 Confirm Phasing Connections

(Phase A, B, C from left to right when facing equipment)

Phase A	Red	[ ]
Phase B	Black	[ ]
Phase C	Blue	[ ]
Neutral	White	[ ]
Ground	Green	[ ]

.2 Measure Voltage

Voltage	Phase A – N	_____ volts
Voltage	Phase B – N	_____ volts
Voltage	Phase C – N	_____ volts
Voltage	Phase N – G	_____ volts
Voltage	Phase A – B	_____ volts
Voltage	Phase B – C	_____ volts
Voltage	Phase C – A	_____ volts

.3 Load Balance

.1 Measure amperage with all loads energized

Phase A _____ amps

Phase B _____ amps

Phase C _____ amps

Neutral _____ amps

.4 Operational Testing

.1 Adjust transformer taps for output voltage ± 2% of rated.
Record tap setting _____% ABOVE NOM.
_____% ELOW NOM.

SYSTEM PERFORMANCE VERIFICATION FORM

PANELBOARD
Project: _____
Date: _____
Completed by: _____
Panelboard I.D.: _____

1. **Test Pre-Requisites**
   - .1 Equipment Verification Complete [ ]

2. **Testing Procedures**
   - .1 Insulation Resistance Testing
     - .1 Isolate equipment
     - .2 Measure insulation resistance
       - Phase A – G _____ ohms
       - Phase B - G _____ ohms
       - Phase C - G _____ ohms
       - Neutral – G _____ ohms
   - .2 Phasing and Voltage Testing
     - .1 Confirm Phasing Connections
       (Phase A, B, C from left to right when facing equipment)

Phase A	Red	[ ]
Phase B	Black	[ ]
Phase C	Blue	[ ]
Neutral	White	[ ]
Ground	Green	[ ]

     - .2 Measure Voltage

Voltage	Phase A – N	_____ volts
Voltage	Phase B – N	_____ volts
Voltage	Phase C – N	_____ volts
Voltage	Phase N – G	_____ volts
Voltage	Phase A – B	_____ volts
Voltage	Phase B – C	_____ volts
Voltage	Phase C – A	_____ volts

   - .3 Load Balance
     - .1 Measure amperage with all loads energized
       - Phase A _____ amps
       - Phase B _____ amps
       - Phase C _____ amps
       - Neutral _____ amps

.4 Operational Testing

.1 Operate each branch breaker and monitor the output to confirm that all contacts are operating properly.

SYSTEM PERFORMANCE VERIFICATION FORM

MOLDED CASE BREAKER TEST REPORT

Project: _____

Date: _____

Completed by: _____

Breaker ID:		Panel ID:	
Manufacturer:		IC Rating (kA):	
Model No.:		Voltage:	
Poles:		Adjustable Magnetic Trip:	
Amp Frame / Trip:		Electronic Trip Unit:	

INSTALLATION REVIEW	**YES**	**NO**	**COMMENTS**
Equipment Conform to Shop Drawings			
Nameplate Complete			
Breaker Identification Lamicoid			
Cable Phasing Identification			
Breaker Bolts Torqued			
Breaker Cable Lugs Tightened			
Red Lacquer all Bolted Connections			
Breaker Interrupting Capacity OK			
Relay Trip Settings Confirmed			
Adjustable Magnetic Trip Properly Set			
Handle Extension Device			
Breaker Lock-Off Device			
Condition of Assembly			
Push-To-Trip Button			
Breaker Mechanical Operation			

TEST RESULTS			
Independent Testing Agent Report Sheets Attached			
Test Results Reviewed			

REMARKS

_____
_____
_____

(Signature of Contractor)	YYYY-MMM-DD
(Signature of Consultant)	YYYY-MMM-DD
(Signature of Commissioning Agent)	YYYY-MMM-DD

Project Name:	
Project #:	
Date Recorded:	

Heat Trace Cable Testing & Commissioning Record

Cable Reference:		Record #:	

Manufacturer:		Type:	
Size:		Fed From:	
Controller/thermostat Setting		Circuit Length:	

	Yes
1. Confirm 30mA ground-fault device (proper rating/function)	☐
2. Visual Inspection inside connection boxes for overheating, corrosion, moisture, loose connections and other problems	☐
3. Proper electrical connection, ground, and bus wires insulated over full length	☐
4. Confirm no damaged or missing thermal insulation; damaged, missing, cracked lagging or weather-proofing	☐
5. Covered end seals, splices, and tees properly labelled on insulation	☐
6. Check controller/thermostat for moisture, corrosion, setpoint, switch operation	☐

Insulation Resistance (Megger) Test

Bus to Braid (Test A)

500 VDC:		1000 VDC		2500 VDC	

Braid to Pipe (Test B)

500 VDC:		1000 VDC		2500 VDC	

Insulation resistance values for Test A and Test B for any particular circuit should be greater than 1000 megaohms and should not vary more than 25 percent as a function of measuring voltage

Project Name:

Project #:

Date Recorded:

Heat Trace Cable Testing & Commissioning Record

Cable Reference:

Record #:

Power Check

Power heating cable and allow it to stabilize for 2 hours

Voltage at Panel (Vac):

Voltage at Circuit End (Vac)

Circuit amps after 2 hours (A)

Pipe Temperature (F) under thermal insulation:

Power (watts/ft) = (V xA after 2 hrs)/circuit length

Circuit Length Verification (Capacitance Test)

Length (ft) = Capacitance (nF) x Capacitance Factor (ft/nf)

Connect the capacitance meter negative lead to both bus wires and the positive lead to the braid wire and measure the capacitance (nF)

Comments:

END OF SECTION

Part 1 General

1.1 TRAINEES

.1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.

.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.2 INSTRUCTORS

.1 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:

.1 Operation, shut-down of equipment, components and systems.

.2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.

.3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.

.2 Contractor and equipment manufacturer to provide instruction on:

.1 Operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.3 TRAINING OBJECTIVES

.1 Training to be detailed and duration to ensure:

.1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.

.2 Effective on-going inspection, measurements of system performance.

.3 Proper preventive maintenance, diagnosis and trouble-shooting.

.4 Ability to update documentation.

.5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.4 TRAINING MATERIALS

.1 Instructors to be responsible for content and quality.

.2 Training materials to include:

.1 "As-Built" Contract Documents.

.2 Operating Manual.

.3 Maintenance Manual.

.4 Management Manual.

.5 PV Reports.

.3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.

.4 Training materials to be in a format that permits future training procedures to same degree of detail.

.5 Supplement training materials:

.1 Transparencies for overhead projectors.
.2 Multimedia presentations.
.3 Manufacturer's training videos.
.4 Equipment models.

1.5 SCHEDULING

.1 Include in Commissioning Schedule time for training.

.2 Deliver training during regular working hours, training sessions to be 3 hours in length.

.3 Training to be completed prior to acceptance of facility.

1.6 RESPONSIBILITIES

.1 Be responsible for:

.1 Implementation of training activities,
.2 Coordination among instructors,
.3 Quality of training, training materials,

.2 Departmental Representative will evaluate training and materials.

.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.7 TRAINING CONTENT

.1 Training to include demonstrations by Instructors using the installed equipment and systems.

.2 Content includes:

.1 Review of facility and occupancy profile.
.2 Functional requirements.
.3 System philosophy, limitations of systems and emergency procedures.
.4 Review of system layout, equipment, components and controls.
.5 Equipment and system operation, monitoring, servicing, maintenance and shut-down procedures.
.6 Maintenance and servicing.
.7 Trouble-shooting diagnosis.
.8 Inter-Action among systems during integrated operation.
.9 Review of O&M documentation.

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

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 Acronyms:

.1 BMM - Building Management Manual.
.2 Cx - Commissioning.
.3 PI - Product Information.
.4 PV - Performance Verification.
.5 WHMIS - Workplace Hazardous Materials Information System.

1.2 GENERAL REQUIREMENTS

.1 Standard letter size paper 216 mm x 279 mm.

.2 Methodology used to facilitate updating.

.3 Drawings, diagrams and schematics to be professionally developed.

.4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

1.3 APPROVALS

.1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Departmental Representative.

1.4 GENERAL INFORMATION

.1 Provide Departmental Representative the following for insertion into appropriate Part and Section of BMM:

.1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of BMM.
.2 Summary of architectural, structural and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.
.1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.
.3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of BMM.
.4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of BMM.
.5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of BMM.
.6 Information on operation and maintenance of equipment installed and commissioned - Section 2.0 of BMM.
.7 Operating and maintenance manual - Section 3.2 of BMM.

.8 Final commissioning plan as actually implemented.

.9 Completed commissioning checklists.

.10 Commissioning test procedures employed.

.11 Completed Product Information (PI) and Performance Verification (PV) report forms, approved and accepted by Departmental Representative.

.12 Commissioning reports.

1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

.1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.

.2 Departmental Representative to review and approve format and organization within 12 weeks of award of contract.

.3 Include original manufactures brochures and written information on products and equipment installed on this project.

.4 Record and organize for easy access and retrieval of information contained in BMM.

.5 Include completed PI report forms, data and information from other sources as required.

.6 Inventory directory relating to information on installed systems, equipment and components.

.7 Approved project shop-drawings, product and maintenance data.

.8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O&M, shutdown and training materials.

.9 Inventory and location of spare parts, special tools and maintenance materials.

.10 Warranty information.

.11 Inspection certificates with expiration dates, which require on-going re-certification inspections.

.12 Maintenance program supporting information including:

.1 Recommended maintenance procedures and schedule.

.2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

1.6 LIFE SAFETY COMPLIANCE (LSC) MANUAL

.1 Samples of LSC Manual will be available from Departmental Representative.

.2 Content of Manual:

.1 All possible Emergency situations modes including: presence of fire and smoke, power failure.

.2 Intrusion and security breach.

.3 Emergency provisions for natural disasters, bomb threats and other disruptive situations.

.4 Emergency control procedures for power and major equipment failure.

.5 Emergency contacts and numbers.

.6 Manual to be readily available and comprehensible to non- technical readers.

1.7 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

.1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:

.1 General

.2 Architectural

.3 Electrical

1.8 IDENTIFICATION OF FACILITY

.1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:

.1 Sallyport Gate and Fence Repairs/ Saskatchewan Penitentiary, Prince Albert, SK.

1.9 USE OF CURRENT TECHNOLOGY

.1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.

.2 Obtain Departmental Representative's approval before starting 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 REFERENCES

.1 Department of Justice Canada (Jus).

.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

.2 Canadian Environmental Protection Act, 1999 (CEPA), c. 33.

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

.1 Material Safety Data Sheets (MSDS).

.3 Transport Canada (TC).

.1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.2 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

.2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.3 SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

.3 Shop drawings.

.1 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.4 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial/Territorial regulations.

.2 Site Meetings.

.1 Convene pre-installation meeting one week prior to beginning work of this Section in accordance with Section 01 32 17 - Construction Progress Schedule - Bar (GANTT) Chart:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building sub-trades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

.3 Hold project meetings every week.

.4 Ensure key personnel, site supervisor, project manager, subcontractor and representatives attend.

.5 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.3 Health and Safety.

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

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Protection.

.1 Protect existing items designated to remain. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.

.3 Waste Management and Disposal.

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

.2 Divert excess materials from landfill to site approved by Departmental Representative.

.3 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste.

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

.5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, and Regional and Municipal regulations.

.6 Label location of salvaged material's storage areas and provide barriers and security devices.

.7 Ensure emptied containers are sealed and stored safely.

.8 Source separate for recycling materials that cannot be salvaged for reuse including wood, metal, concrete and asphalt, and gypsum.

.9 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

1.6 SITE CONDITIONS

.1 Site Environmental Requirements.

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

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

.3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

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

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

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

.2 Existing Conditions.

.1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction from site, prior to start of demolition Work, and dispose of in safe manner in accordance with TDGA and other applicable regulatory requirements and Section 02 81 01 - Hazardous Materials.

1.7 SCHEDULING

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Departmental Representative in writing when unforeseen delays occur.

Part 2 Products

2.1 EQUIPMENT

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

Part 3 Execution

3.1 PREPARATION

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

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

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

.4 Disconnect and Cap Designated Mechanical Services.

.1 Natural Gas Supply Lines: contact utility company to arrange for removal as directed by Departmental Representative.

.2 Sewer and Water Lines: remove in accordance with authority having jurisdiction as directed by Departmental Representative and securely plug to form watertight seal.

.3 Other Underground Services: remove and dispose of as directed by Departmental Representative.Underground Storage Tanks: remove and dispose of in accordance with CCME PN1326 and directions of Departmental Representative.

3.2 REMOVAL OF HAZARDOUS WASTES

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

3.3 REMOVAL OPERATIONS

.1 Remove items as indicated.

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

.3 Removal of Pavements, Curbs and Gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

.5 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

.6 Stockpile topsoil for final grading and landscaping.

.1 Provide erosion control and seeding if not immediately used.

.7 Disposal of Material.

.1 Dispose of materials not designated for salvage or reuse on site in accordance with governing regulations.

.8 Backfill.

.1 Backfill in areas as indicated.

3.4 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.3 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

3.6 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

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

3.7 CLEANING

.1 Remove debris, trim surfaces and leave work site clean, upon completion of Work

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA S350-M1980(R1998), Code of Practice for Safety in Demolition of Structures.

.2 Department of Justice Canada (Jus).

.1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.

.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.

.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.3 U.S. Environmental Protection Agency (EPA)/Code of Federal Regulations (CFR), Title 40 - Protection of Environment, Chapter 1, Subchapter C - AIR, Part 86 - CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES.

.1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.

.2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.

1.2 DEFINITIONS

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.3 SUBMITTALS

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

.2 Where required by authorities having jurisdiction, submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.

.3 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Provinces of Saskatchewan, Canada.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial/Territorial and Municipal regulations.

.2 Meetings:

.1 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work.

.2 Hold project meetings every week.

.3 Ensure key personnel attend.

.4 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

.2 Divert excess materials from landfill to site approved by Departmental Representative.

1.6 ENVIRONMENTAL PROTECTION

.1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.

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

.3 Fires and burning of waste or materials is not permitted on site.

.4 Do not bury rubbish waste materials.

.5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout project.

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

.7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.

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

.9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.7 EXISTING CONDITIONS

.1 Should material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.

.2 Structures to be demolished to be based on their condition at time of examination prior to tendering.

1.8 SCHEDULING

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.1 In event of unforeseen delay notify Departmental Representative in writing.

Part 2 Products

2.1 EQUIPMENT

.1 Equipment and heavy machinery to:

.1 On-road vehicles to meet applicable emission requirements as prescribed in CEPA-SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.

.2 Off-road vehicles to meet applicable emission requirements as prescribed in EPA CFR 86.098-10 and EPA CFR 86.098-11.

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

Part 3 Execution

3.1 PROTECTION

.1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, parts of existing building to remain.

.1 Provide bracing, shoring and underpinning as required.

.2 Repair damage caused by demolition as directed by Departmental Representative.

.2 Support affected structures and, if safety of structure being demolished or adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.

.3 Prevent debris from blocking surface drainage system, mechanical and electrical systems which must remain in operation.

3.2 PREPARATION

.1 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Disconnect and re-route electrical and telephone service lines entering buildings to be demolished.

.1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.

.3 Disconnect and cap designated mechanical services.

.1 Natural gas supply lines: remove in accordance with gas company requirements.

.2 Sewer and water lines: remove as directed by Departmental Representative.

.3 Other underground services: remove and dispose of as indicated.

.4 Do not disrupt active or energized utilities designated to remain undisturbed.

.5 Remove rodent and vermin as required by Departmental Representative.

3.3 SAFETY CODE

.1 Do demolition work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.2 Blasting operations not permitted during demolition.

3.4 REMOVAL OF HAZARDOUS WASTES

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

.2 Prior to start of demolition work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of at designated disposal facilities in safe manner and in accordance with TDGA and other applicable requirements and Section 02 81 01 - Hazardous Materials. Refer to Existing Conditions in Part 1.

3.5 DEMOLITION

.1 Demolish parts of structures as indicated.

.2 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

.3 At end of each day's work, leave Work in safe and stable condition.

.1 Protect interiors of parts not to be demolished from exterior elements at all times.

.4 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.

.5 Only dispose of material specified by selected alternative disposal option as directed by Departmental Representative.

.1 Additional disposal options to be provided by Departmental Representative, on-site waste diversion representative prior to disposal.

.6 Do not dispose materials in landfill or waste stream destined for landfill.

.7 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

.8 Use natural lighting to do Work where possible.

.1 Shut off lighting except those required for security purposes at end of each day.

3.6 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

.5 Supply separate, clearly marked disposal bins for categories of waste material. Do not remove bins from site until inspected and approved by Departmental Representative. Please notify Departmental Representative prior to removal of bins from site.

3.7 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project construction.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 Export and Import of Hazardous Waste Regulations (SOR/2002-300).

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

.1 Material Safety Data Sheets (MSDS).

.3 National Fire Code of Canada 2005.

.4 Transportation of Dangerous Goods Act (TDG Act) 1999, (c. 34).

.5 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).

1.2 DEFINITIONS

.1 Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations.

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

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

.4 Workplace Hazardous Materials Information System (WHMIS): A Canada-wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.

1.3 SUBMITTALS

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

.2 Product Data:

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

.1 Submit to Departmental Representative current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.

.2 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

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

.4 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled.

.5 Abide by the following storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers which are in good condition.

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

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

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are not mixed.

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

.7 Maintain a clear egress from storage area.

.8 Store hazardous materials and wastes in a manner and location which will prevent them from spilling into the environment.

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

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

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

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

1.5 TRANSPORTATION

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

Part 2 Products

2.1 MATERIALS

.1 Only bring on site the quantity of hazardous materials required to perform work.

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

Part 3 Execution

3.1 DISPOSAL

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is an approved, cost effective recycling process available.

.3 Send hazardous wastes only to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in a timely fashion in accordance with applicable provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CAN/CSA-A23.1- Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-O86.1- Engineering Design in Wood (Limit States Design).
- .3 CSA O121- Douglas Fir Plywood.
- .4 CSA O151- Canadian Softwood Plywood.
- .5 CSA O153- Poplar Plywood.
- .6 CSA O437 Series- Standards for OSB and Waferboard.
- .7 CSA S269.1- Falsework for Construction Purposes.
- .8 CAN/CSA-S269.3- Concrete Formwork.

1.2 WASTE MANAGEMENT AND DISPOSAL

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

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

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

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

.2 Form ties:

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

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

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

.5 Void form to section 033000.

.6 Fillets for chamfered corners: hardwood type, 25mm x 25mm, maximum length possible.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Consultant's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.

.6 Align form joints and make watertight. Keep form joints to minimum.

.7 Use 25 mm chamfer strips on external corners unless noted otherwise

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

.9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.10 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

.11 WINTER CONSTRUCTION

.1 Remove ice and snow from within the forms.

.2 The use of de-icing salts will not be permitted.

.3 Unless formwork and concrete construction proceed within a heated enclosure, do not use water to clean out completed forms. Use compressed air or other means to remove foreign matter.

.12 Construct formwork to maintain the following maximum tolerances:

.1 Deviation from horizontal and vertical lines:
6mm in 3000 mm
12mm in 12000 mm

.2 Deviation of building, dimensions indicated on Drawings and position of columns, walls and partitions: 6 mm.

.3 Deviation in cross sectional dimensions of columns or beams or in thickness of slabs and walls: plus or minus 6mm.

.4 In addition to tolerances specified, any exposed concrete surface which is to receive an applied finish must be level, flat and plumb (vertical) within a tolerance of 3 mm in 3000 mm.

3.2 REMOVAL AND RESHORING

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

.1 4 days for walls and sides of beams.

.2 7 days for columns.

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

.3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

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

1.2 REFERENCES

.1 American Concrete Institute (ACI)

.1 ACI 315R-, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 American National Standards Institute/American Concrete Institute (ANSI/ACI)

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

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-A23.1-, Concrete Materials and Methods of Concrete Construction.

.2 CAN3-A23.3-, Design of Concrete Structures for Buildings.

.3 CAN/CSA-G30.18-, Billet-Steel Bars for Concrete Reinforcement.

.4 CAN/CSA-G40.21-, Structural Quality Steels.

.5 CAN/CSA-G164-, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186-, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00- Submittal Procedures.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Consultant, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada .

.3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 MATERIALS

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

.2 Reinforcing steel: billet steel, deformed bars, grade 300 for ties and stirrups, grade 400 for all other bars, to CAN/CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-30.18.

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

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

.6 Mechanical splices: subject to approval of Consultant.

.7 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.

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

.3 Upon approval of Consultant, 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 Consultant.

.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 Consultant's approval of reinforcing material and placement.

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

.4 Clear distance between adjacent bars and splices shall be not less than 1.4 times the largest bar diameter, not less than 1.4 times the largest aggregate, and not less than 30 mm.

.5 Reinforcing steel shall, where not otherwise shown on the structural drawings, be protected by concrete cover over the reinforcement as follows:

.1 Where concrete is formed against earth, not less than 75 mm.
.2 In girders, beams, and columns exposed to the weather or in contact with soil, not less than 50 mm to principal reinforcement 35 M or smaller, and not less than 40 mm to ties and stirrups.
.3 In slabs and walls exposed to the ground or weather, not less than 30 mm for 20M and smaller bars.
.4 In slabs and walls not exposed to the ground or weather, not less than 20mm for 20M and smaller bars.
.5 In beams, girders and columns not exposed to the ground or weather, not less than 40mm to principal reinforcement 35M or smaller and not less than 30 mm to ties and stirrups.
.6 For bars larger than allowed in above, provide 1.5 times the bar diameter for exposed conditions and 1.0 times the bar diameter for conditions not exposed.
.7 Concrete covers shall be maintained within $\pm$ 5 mm of that required.

3.3 REINFORCING FOR MISCELLANEOUS CONCRETE

.1 Unless indicated otherwise on drawings, reinforce miscellaneous concrete to one of the following:

Sections up to 100 mm thick: 10M @ 500 o.c. each way mid depth
Sections up to 150 mm thick: 10M @ 300 o.c. each way mid depth
Sections up to 200 mm thick: two layers of 10M @ 400 o.c. each way
Thickened Edges: 4-15M cont.
Cylindrical Sections up to 400 mm dia: 4-15M cont. c/w 10M ties @ 300 o.c.
Cylindrical Sections up to 600 mm dia: 5-20M cont. c/w 10M ties @ 450 o.c.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C260-, Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494-, Specification for Chemical Admixtures for Concrete.

.2 Canadian Standards Association (CSA)

.1 CSA-03001-08 Cementitious Materials Compendium

.2 CAN/CSA-A23.1-, Concrete Materials and Methods of Concrete Construction.

.3 CAN/CSA-A23.2-, Methods of Test for Concrete.

1.3 CERTIFICATES

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

.2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.

.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.4 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Section 01 45 00 - Quality Control for Consultant's approval for following items:

.1 Cold weather concrete.

.2 Curing.

.3 Finishes.

.4 Formwork removal.

.5 Joints.

1.5 INSPECTION AND TESTING

.1 Concrete testing shall be carried out by an independent testing agency, certified by CSA in accordance with the requirements of CSA A283.

.2 Concrete testing shall be paid for by the Contractor

.3 The testing agency shall be responsible for sampling, initial curing and transporting of test cylinders to the Laboratory.

.4 Notify the Consultant and Testing Agency at least 24 hours prior to each concrete pour.

.5 Provide free access to all portions of work and cooperate with appointed firm.

.6 Concrete testing shall consist of three (3) test cylinders taken for every 50 cubic meters or less of each class of concrete placed each day. One (1) cylinder to be tested at 7 days, the remaining two (2) cylinders to be tested at 28 days.

.7 For concrete walks, curbs and gutters, three (3) concrete test cylinders shall be taken for every 75 cubic metres or less of concrete placed each day.

.8 One (l) additional test cylinder shall be taken during cold weather concreting, and be cured on jobsite under same conditions of concrete it represents.

.9 One (l) slump test and one (1) air content test shall be taken for each set of test cylinders taken.

.10 One (1) slump test shall be taken before and one (1) slump test shall be taken after the addition of plasticizer to the concrete mix.]**

.11 Testing of concrete shall be performed in accordance with CAN/CSA-A23.2.

.12 Test results shall be issued to the Architect, Structural Engineer, Contractor, Owner and Ready-mixed Concrete Supplier. Test reports are to be numbered consecutively beginning with number one, and identify the location of the concrete placement in the project.

.13 Required retesting will be paid for by the Contractor.

.14 The Consultant may order additional testing any time even though the required tests indicate the strength requirements have been met. In this instance, the Owner will pay for those tests that meet the specified requirements and the Contractor shall pay for those that do not.

.15 Non-destructive methods for testing concrete shall be according to CAN/CSA-A23.2.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 PRODUCTS

2.1 MATERIALS

.1 Portland cement, supplementary cementing materials and hydraulic slag to CSA-03001, Cementitious Materials Compendium

.2 Water: to CAN/CSA-A23.1.

.3 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density. The fine aggregate for concrete slabs that are to be finished with dry shake hardener shall contain a maximum of 0.4% clay particles as determined by CSA Test A23.2-3A "Clay Lumps in Natural Aggregate". Test results shall be submitted to Consultant for review.

.4 Air entraining admixture: to ASTM C260.

.5 Chemical admixtures: to ASTM C494. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Concrete retarders: to ASTM C494 water based, low VOC. Do not allow moisture of any kind to come in contact with the retarder film.

.7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.

.1 Compressive strength: 40 MPa at 7 days.

.2 Consistency:

.1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30s.

.2 Flowable: to ASTM C827. Flow table, 5 drops in 3s, (ASTM C109, applicable portion) 125 to 145%.

.3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125 %.

.4 Dry pack to manufacturer's requirements.

.9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 40 MPa at 7 days.

.10 Drilled concrete Wedge Anchors: to be Hilti Kwik-Bolt, Power-Stud, or Ucan Wedge Anchors. Sized as per drawings. Minimum embedment length of all Wedge Anchors to be 150mm unless noted otherwise.

.11 Screen Tube and Epoxy Anchors: Hilti HIT Adhesive System, Power-Fast Epoxy System, Ucan Poly-All Renovation Anchoring System, Epcon A7, or Sikadur Injection Gel Fast Set System of sizes specified on the drawings.

.12 Void Form: Void form shall be one of the following:

.1 system made decomposable cardboard slab and beam forms

.2 GeoVoid compressible void filler manufactured by PlastiSpan. GeoVoid compressible void filler system to be designed and installed to fail at a maximum net uplift pressure of 1.2 kPa when combined with concrete self weight alone. Void space shown on drawings is sized for cardboard void form. For GeoVoid, increase depth of void to provide space for crushed material. Contractor to provide shop drawings sealed by a professional engineer registered in the province of Saskatchewan. Shop drawings to provide detailed information regarding slab uplift pressures.

2.2 MIXES

.1 Concrete to be proportioned according to the notes on the drawings for the Location and Class of Exposure indicated.

.2 Do not change concrete mix without prior approval of Consultant. Should change be proposed, submit new mix design to Consultant for review.

.3 Each load of ready-mixed or transit-mixed concrete delivered to the project site shall be accompanied by duplicate delivery slips providing the following information:

.1 Name and location of batch plant;

.2 Date and serial number of ticket;

.3 Name of contractor;

.4 Specific designation of job (name and location);

.5 Specific class or designation of concrete in conformance with Table 6;

.6 Amount of concrete in cubic metres;

.7 Truck number, cumulative total, and/or load number; and

.8 Time loaded or time of first mixing of cement and aggregate.

.4 Space shall also be provided for the following information, which is to be registered by the producer's representative on at least two copies of the delivery ticket, after discharge has been completed:

.1 The time that the load arrived on the project;

.2 The time that the discharge of load was started;

.3 The time that the discharge of load was completed.

.5 Use of accelerating admixtures in cold weather only when approved by Consultant. If approved, the use of admixture will not relax cold weather placement requirements.

.6 Use set-retarding admixtures during hot weather only when approved by the Consultant.

.7 Use plasticizers when required to place concrete of specified slump.

.8 No water shall be added to the concrete mix on site.

PART 3 EXECUTION

3.1 PREPARATION

.1 Obtain Consultant's approval before placing concrete. Provide 48 hours notice prior to placing of concrete.

.2 Ensure reinforcement and inserts are not disturbed during concrete placement.
.3 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
.4 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
.5 Do not place load upon new concrete until authorized by Consultant.

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
.2 Anchor bolts.
  .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
  .2 Coordinate anchor bolt locations and quantities with gate manufacturer.

3.3 COLD WEATHER REQUIREMENTS

.1 When the air temperature is at or below 5 degrees C. or when there is a probability of it falling to that limit during the placing or curing period, cold weather requirements shall be applicable.
.2 Protection shall be provided for newly placed concrete by means of suitable enclosures, coverings and/or adequate insulation as indicated in CAN/CSA-A23.1, Clause 7.4.
.3 Concrete shall not be placed on or against reinforcement, formwork, ground or any surface that is at a temperature less than 5°C.
.4 The temperature of the concrete at all surfaces shall be maintained at not less than 10°C for a minimum of three days or for the time necessary to attain a minimum strength of 15 mPa. Means shall be provided to humidify the air within enclosures and to keep the concrete and formwork continuously moist if dry heat is used.
.5 At the end of the specified protection period the temperature of the concrete shall be reduced gradually to the temperature differential shown in CAN/CSA-A23.l, Table 21.
.6 Accelerator or so-called anti-freeze compounds shall not be permitted unless otherwise approved in writing by the Consultant.
.7 All protective coverings shall be kept clear of the concrete and form surfaces to permit free circulation of air and shall be maintained intact for at least 24 hours after artificial heat is discontinued.

3.4 HOT WEATHER REQUIREMENTS

.1 When the air temperature is at or above 27°C or when there is a probability of its rising to 27°C during the placing period (as forecast by the local official meteorological office) special effort shall be made to maintain the temperature of the concrete no more than that stipulated in CSA A23.1 Table 14.
.2 Time of initial mixing to complete discharge shall not exceed one hour and fifteen minutes.
.3 In extremely hot weather, the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun, or cooled by fogging and evaporation.

3.5 PROTECTION FROM DRYING OF EXPOSED CONCRETE SURFACES

.1 When the rate of surface evaporation exceeds .5 kg/m^2.hr take measures to reduce surface evaporation from concrete.
.2 When the rate of surface evaporation exceeds .75 kg/m2.h erect windbreaks around the sides of the structural element.

.3 When the rate of surface evaporation exceeds 1.0 kg/m^2.h take one or more of the following measures:
- .1 Dampen the subgrade prior to placing the concrete;
- .2 Erect sunshades over the concrete during finishing operations;
- .3 Lower the concrete temperature;
- .4 Cover the concrete surface with white polyethylene sheeting between the various finishing operations;
- .5 Apply fog spray immediately after placement and before finishing. Care shall be taken to prevent accumulation of water that may reduce the quality of the cement paste;
- .6 Begin curing of the concrete immediately after trowelling; or
- .7 Place and finish at night.

.4 The rate of evaporation shall be estimated from CAN/CSA-A23.1 Figure D1 of Appendix D using measurements of relative humidity, concrete temperature, air temperature and wind velocity.

3.6 CURING

.1 Initial and final curing of all concrete surfaces to CAN/CSA-A23.1.

.2 The basic curing period shall be extended until the concrete achieves two-thirds of its specified 28 day compressive strength.

3.7 CONSTRUCTION JOINTS

.1 The location and detail of all construction joints not detailed on the structural drawings shall be approved by the Consultant.

.2 Where fresh concrete is to be placed against concrete which has set or has partially set, the surface of the set or partially set concrete shall be roughened, cleaned of all laitance, and bonding agent applied prior to the placement of fresh concrete.

.3 Concrete placed in column forms shall be struck off flush with the underside of the member above.

3.8 FINISHING OF FORMED SURFACES

.1 All formed surfaces unless noted otherwise shall be finished with a Rough form in accordance with CAN/CSA-23.1, Clause 7.9.2.4 and to Consultant's approval. Remove all protrusions, ridges and other irregularities.

3.9 DEFECTIVE CONCRETE

.1 Concrete not meeting the requirements of the Specifications and drawings shall be considered defective concrete.

.2 Concrete not conforming to the lines, details and grade specified herein or as shown on the drawings shall be modified or replaced at the Contractor's expense and to the satisfaction of the Consultant. Finished lines, dimensions and surfaces shall be correct and true within tolerances specified in the Formwork Section of these Specifications.

.3 Concrete not properly placed resulting in excessive honeycombing and all honeycombing and other defects in critical areas of stress, shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Consultant.

.4 Concrete of insufficient strength or improper consistency shall be, as required by the Consultant, subject to one or more of the following:
- .1 Changes in mix proportions for the remainder of the work.

.2 Cores drilled and tested from the areas in question as directed by the Consultant and in accordance with CAN/CSA-A23.2. The test results shall be indicative of the in-place concrete.

.3 Load testing of the structural elements in accordance with CAN/CSA-A23.3.

.4 The changes in the mix proportions and the testing shall be at the Contractor's expense.

.5 Concrete failing to meet the strength requirements of this Specification shall be strengthened or replaced at the Contractor's expense and to the satisfaction of the Consultant.

3.10 PATCHING CONCRETE

.1 After the removal of the forms concrete surfaces may be subject to inspection by the Consultant.

.2 All exposed metal form ties, nails, wires, shall be removed, fins broken off and all loose concrete removed.

.3 Form tie pockets shall be thoroughly wetted and patched with patching concrete followed by proper curing.

.4 Honeycombed and other defective surfaces shall be chipped away to a depth of not less than 25mm with the edges perpendicular to the surface, thoroughly wetted and patched with patching concrete followed by proper curing.

.5 Patching concrete shall be thoroughly compacted into place and finished in such a manner as to match the adjoining concrete. The design mix of the patching concrete shall be approved by the Consultant.

.6 Fill with grout and finish smooth all openings and holes provided to accommodate the various trades. Work after all pipes, conduits, ducts and such items have been placed.

3.11 VOID FORM

.1 Install cardboard void form in strict accordance with manufacturers recommendations. Contractor to ensure that void form decomposes after casting concrete.

.2 Install GeoVoid compressible void filler system in strict accordance with manufacturers recommendations.

3.12 SLAB FINISHING

.1 Exterior concrete slabs: light broom.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA-A82-06, Fired Masonry Brick Made From Clay or Shale.

.2 CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.

.3 CAN/CSA-A370-04(R2009), Connectors for Masonry.

.4 CAN/CSA A371-04(R2009), Masonry Construction for Buildings.

.5 CSA S304.1-04(R2009), Design of Masonry Structures.

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

.1 Material Safety Data Sheets (MSDS).

.3 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015(NBC).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry products and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit copies of WHMIS MSDS in accordance with Section 01 35 43- Environmental Procedures and Section 01 35 29.06- Health and Safety Requirements.

.1 Indicate VOC's in g/L for epoxy coatings and galvanized protective coatings and touch-up products to be applied within building envelope.

.3 Shop Drawings:

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

.2 Shop drawings consist of bar bending details, lists and placing drawings.

.3 Placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit full size sample of each type masonry units.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect masonry products from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse by manufacturer and return of crates, pallets, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MASONRY UNITS

.1 Burned clay brick: to CAN/CSA-A82.

.1 Type: S.

.2 Grade: EG.

.3 Size: to match approved sample

.4 Colour and texture: to match approved sample.

2.2 REINFORCEMENT AND CONNECTORS

.1 Connectors shall be corrosion resistant: to CAN/CSA-A370.

2.3 MORTAR AND GROUT

.1 Mortar: to CAN/CSA-A179.

.1 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.

.2 Colour: ground coloured natural aggregates or metallic oxide pigments.

.2 Mortar Type: S based on property specifications,

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

.1 Bond: match existing.

.2 Coursing height: match existing

.3 Jointing: match existing.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings when applicable, with minimum of cutting.

3.3 CONSTRUCTION

.1 Exposed masonry:

.1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.

.2 Cut out for recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.

.2 Building-in:

.1 Build in items required to be built into masonry.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Install steel lintels over openings where indicated.

.3 Interface with other work:

.1 Cut openings in existing work as indicated.

.2 Openings in walls: approved by Departmental Representative.

.3 Make good existing work. Use materials to match existing.

3.4 REINFORCING AND CONNECTING

.1 Install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing mortar, obtain Departmental Representative's approval of placement of reinforcement and connectors.

3.5 BONDING AND TYING

.1 Tie masonry veneer to backing in accordance with National Building Code of Canada (NBC), CAN/CSA-A371, CSA S304.1 and as indicated.

3.6 SITE TOLERANCES

.1 Tolerances of CAN/CSA-A371 apply.

3.7 CLEANING

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

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

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

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

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

3.8 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.2 Repair damage to adjacent materials caused by masonry products installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA G40.20/G40.21-, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-G164-, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16-, Limit States Design of Steel Structures.
- .4 CSA W47.1-, Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA W48-, Filler Metals and Allied Materials for Metal Arc Welding.
- .6 CSA W55.3-, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .7 CSA W59-, Welded Steel Construction (Metal Arc Welding).

1.3 DESIGN REQUIREMENTS

.1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.

.2 Shear connections:

- .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
- .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

.3 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of Saskatchewan, Canada for non standard connections.

1.4 SHOP DRAWINGS

.1 Submit shop drawings including fabrication and erection documents and materials list in accordance with Section 01 33 00 - Submittal Procedures.

.2 Ensure Fabricator drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the provinces of Saskatchewan, Canada.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 MATERIALS

.1 Structural steel: to CAN/CSA-G40.20/G40.21

W Shapes: new material conforming to CAN/CSA-G40.21-M92, Grade 350W.

.2 Anchor bolts: to CAN/CSA-G40.20/G40.21, Grade 260W.

.3 Bolts, nuts and washers: to ASTM A325

.4 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.5 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m^2.

2.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 CAN/CSA-S136 and in accordance with reviewed shop drawings.

Part 3 Execution

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16 CAN/CSA-S136.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Consultant for direction before commencing fabrication.

3.3 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 CAN/CSA-S136 and in accordance with reviewed erection drawings.

.2 Field cutting or altering structural members: to approval of Consultant.

3.4 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by Consultant.

3.5 FIELD PAINTING

.1 Touch up galvanizing on any damaged surfaces

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 CSA International

.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.4 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

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

.1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, and bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit [two] copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:

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

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 QUALITY ASSURANCE

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

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

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

.2 Welding materials: to CSA W59.

.3 Welding electrodes: to CSA W48 Series.

.4 Bolts and anchor bolts: to ASTM A307.

2.2 FABRICATION

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

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

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

.2 Galvanizing Touch-up Paint: Make good corrosive protection after welding where burnt by welding operations, where existing chain link has been released from existing weld locations to cover existing touch-up paint applications and where removed to facilitate welding operations, using zinc touch-up primer conforming to CAN/CGSB-1.181-99 and finish coat to ensure finish matches the galvanizing finish on all pipes. Matt grey touch-up paint will not be accepted.

2.4 CLOSURE ANGLES

.1 Fabricate closure angles used to close up space between perimeter wall and new sallyport gate structures: galvanized, sizes as indicated.

2.5 MISCELLANEOUS STEEL ITEMS AROUND WALL OPENING AT GATE VMG 1

.1 Fabricated as indicated.

2.6 MISCELLANEOUS ITEMS

.1 Fabricate all other metal fabrication items or miscellaneous metal items required to complete the project.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

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

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Weld field connections.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

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

3.3 CLOSURE ANGLES

.1 Install closure angles as indicated.

3.4 MISCELLANEOUS STEEL ITEMS AROUND WALL OPENING AT GATE VMG 1

.1 Install as indicated.

3.5 MISCELLANEOUS ITEMS

.1 Install all other metal fabrication items or miscellaneous metal items required to complete the project as indicated.

3.6 CLEANING

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

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

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

.3 Waste Management: separate waste materials for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

1.0 CODES AND STANDARDS

.1 Complete installation in accordance with the latest edition of the Canadian Electrical Code Part I (CSA C22.1) and the Saskatchewan Supplement, as well as Municipal and Provincial Codes and Regulations and the local authorities having jurisdiction. Where this specification is at variance with applicable Codes and Standards, the more stringent shall apply.

.2 Comply with CSA Electrical Bulletins and Certification Standards in force at time of bid submission. While not identified and specified by number in this Division, these Bulletins and Standards are to be considered as forming part of related CSA Part II Standard.

.3 All references to Codes and Standards refer to the latest edition in force at the time of bid unless specified otherwise.

.4 Under no circumstances shall the Codes and Standards referred to above and herein, be interpreted to allow a lower standard than specified elsewhere herein.

.5 Complete overhead systems in accordance with CSA C22.3 No. 1 and underground systems in accordance with C22.3 No. 7 except where specified otherwise.

.6 Abbreviations for electrical terms: to CSA Z85.

.7 Complete all work in a neat manner performed by qualified tradesmen. All work shall be completed under the on-site direction of a journeyman electrician.

2.0 QUALIFICATIONS

.1 Designate a foreman / superintendent holding a journeyman's certificate to assume complete responsibility for the electrical construction work. Minimum experience requirement for this position is five (5) years experience as a journeyman foreman / superintendent. Submit the name, qualifications, and experience to the electrical consultant for approval.

.2 Furnish qualified personnel to continuously direct and monitor electrical construction work.

.3 Attend site meetings.

3.0 PERMITS, FEES

.1 The electrical consultant will submit to the Electrical Inspection Department and Supply Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work. The electrical contractor shall pay all fees associated with this examination and approval.

.2 Obtain and pay fees associated with all electrical inspections.

4.0 APPROVED EQUIVALENTS/ALTERNATES

.1 The listing of a manufacturer and his respective type or catalogue number as the basis of design, is to establish the construction features, sizes, quality, and accessories of an item of equipment in addition to the characteristics specified.

.2 Approval of equivalent products will be granted on the basis of the manufacturer, and general design only. Such approval does not relieve the electrical contractor and/or supplier from providing all necessary components and finishes as called for on the drawings or in the specifications.

.3 Request for equals must be received in the electrical consultant's office not less than seven working days prior to subcontractor bid closing date.

.4 A detailed line-by-line compliance comparison of any product submitted for approval, must be submitted. Exceptions and non-compliance shall be clearly identified. Requests for equals must include the following:

.1 A detailed bill of materials correlating each item of equipment to those specified.

.2 Catalogue product data sheet for each proposed item of equipment. If more than one model is shown on the data sheet, indicate exactly which model is proposed.

.3 Copy of the specification section with each paragraph marked to show where on the product data sheet the specification requirement is satisfied (use specification cross reference numbers on the product data sheet).

.4 If compliance with any specification requirement cannot be substantiated by reference to published data provide a typewritten compliance statement signed by an executive officer of the manufacturer. Stating that the executive proposed products comply with all specified requirements.

.5 A contractor quoting on materials or equipment not thus approved, does so at his own risk and will be required to install those products which are approved.

.6 The Contractor shall make allowances in his bid for the cost of any associated changes in this division made necessary by the selection of an approved product other than that named as the basis of designs. Additional costs to this division due to the departure from equipment named shall be borne by the contractor.

5.0 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples in accordance with the requirements of General Conditions.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material. All shop drawings shall be identified with the project name.

.3 Where applicable, include wiring, single line and schematic diagrams.

.4 Include wiring drawings or diagrams showing interconnection with work of other Sections.

.5 Submit a copy of each shop drawing in electronic PDF format to the electrical consultant for review. PDF documents must be generated by manufacturer’s software, or from electronically published documentation. PDF documents generated by scanning technology are not acceptable. Consultant will return shop drawing submittals via email for distribution. It is the responsibility of the Contractor to ensure adequate copies of the

shop drawings are distributed to required parties, including a copy at the construction site.

.6 If hard copies are submitted, submit three (3) copies of each shop drawing to the electrical consultant for review. Two copies will be returned to the architect who will subsequently return one copy to the Contractor (to produce required copies at his expense).

.7 All electrical shop drawings for the project shall be submitted at one time and within 30 days of contract signing.

6.0 DRAWINGS AND SPECIFICATIONS

.1 Examine also the architectural and structural drawings and specifications.

.2 Drawings do not indicate all construction details. Any installation involving accurate measurements of the building shall be coordinated with construction drawings and/or actual on-site measurements.

.3 Drawings and specifications are intended to supplement each other, and any information indicated on one and omitted on the other shall be assumed as included on both.

.4 The electrical sub-contractor shall peruse the architectural drawings and specifications to confirm size and location of all motors, controls, and other equipment in order to determine exact electrical requirements of all mechanical equipment. Ensure that all electrical work noted on architectural drawings and specifications are included in the electrical contract bid price.

.5 In order to provide sufficient detail and clarity, the symbols used for various electrical devices, occupy more space on the drawing, than the device actually occupies when installed. The electrical sub-contractor shall use common sense when actually placing these devices, ensuring that devices are grouped wherever possible. Do not space devices along wall to coincide with the scale location of the electrical device symbol.

.6 Bidders finding discrepancies or omissions in the specifications or drawings, or having doubt as to the meaning or intent thereof, shall at once notify the Consultant who will, if necessary, send written instructions or explanation to all bidders. Oral interpretations made to any bidder shall not effect a modification of any provision of the bid documents.

7.0 EXAMINATION OF THE SITE

.1 Prior to submitting bid, visit the site and thoroughly investigate the location, connection points, and details of all services and systems which, in any way, may affect or tie-in with the work covered in these specifications and accompanying drawings. No extra will be considered for work resulting from conditions that would have been evident upon thorough examination of the site.

.2 Any discrepancies, points of doubt, or contention shall be made known to the electrical consultant in writing not later than seven (7) days prior to closing date of tender; otherwise, allow for the most expensive alternative.

8.0 VOLTAGE RATINGS

.1 Operating Voltages: to CAN3 C235.

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

.3 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

9.0 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with the requirements of General Conditions.

.2 Equipment and material to be CSA certified, and manufactured to standard quoted.

.3 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Department.

.4 Factory assemble control panels and component assemblies.

.5 Uniformity of manufacturer shall be maintained for any particular item or type of equipment throughout the building.

10.0 ELECTRICAL MOTORS, EQUIPMENT AND CONTROLS

.1 Supplier and Installer responsibility is indicated in Motor Control and Equipment Schedule on electrical drawings.

.2 Control wiring and conduit is specified in Division 26 including conduit, wiring, and connections below 50V which are related to gate control systems.

11.0 FINISHES

.1 Shop finish metal enclosures by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finished enamel.

.1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1.

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

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

.3 Clean, prime, and paint exposed hangers, racks, fastenings to prevent rusting.

.4 All electrical fittings, supports, hanger rods, pull boxes, channel fittings, conduit racks, outlet boxes, brackets, clamps, etc. shall either have a galvanized finish, or have a painted finish over corrosion resistant primer.

.5 Where indicated herein and on drawings, provide finishes to match samples as provided by the architectural consultant.

12.0 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

Nameplates:

.1 Plastic laminate engraving sheet, 3 mm thick, black face, white core, self-adhesive. Nameplates identifying emergency power system circuits shall be red face with white core.

.2 Nameplate sizes:

Size 1 7 X 25 mm 1 line 3 mm high lettering
Size 2 7 x 40 mm 1 line 5 mm high lettering
Size 3 12 x 70 mm 2 lines 3 mm high lettering
Size 4 20 x 90 mm 1 line 8 mm high lettering
Size 5 20 x 90 mm 2 lines 5 mm high lettering
Size 6 25 x 100 mm 1 line 12 mm high lettering
Size 7 25 x 100 mm 2 lines 6 mm high lettering

.3 Wording on nameplates to be approved prior to manufacture.

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

.5 Identification to be English.

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

.7 Nameplates for disconnects, starters, contactors and control stations shall indicate equipment being controlled, and voltage.

.8 Nameplates for transformers shall indicate capacity, primary, and secondary voltages.

.9 All nameplates shall be mechanically attached with a minimum of two chrome self tapping screws as well as the self adhesive.

13.0 WIRING IDENTIFICATION

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

.2 Maintain phase sequence and colour coding throughout.

.3 Colour Code: to CSA C22.1.

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

14.0 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, and metallic sheathed cables.

.2 Code with 305 mm band of coloured spray paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals in accessible ceiling spaces and service spaces:

600 V	Yellow
Emergency Power	Orange

15.0 JUNCTION BOX IDENTIFICATION

.1 Identify all system junction boxes with enamel spray paint on entire cover. Colour shall match those specified for conduit and cable identification.

.2 Identify all junction boxes, containing branch circuit conductors, with neat hand lettering using black felt marker indicating panel and breaker number (i.e. “B-24). Provide corresponding identification on surface adjacent to junction box as well.

16.0 WIRING TERMINATIONS

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

17.0 MANUFACTURER'S AND CSA LABELS

.1 Manufacturer's nameplates and CSA labels to be visible and legible after equipment is installed.

18.0 WARNING SIGNS

.1 Provide warning signs, as specified or to meet requirements of Inspection Department.

.2 Use decal signs, minimum 175 x 250 mm size.

19.0 MOUNTING HEIGHTS

.1 Mounting heights of devices and equipment shall as per CSA B651.

20.0 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS" or with appropriate voltage in English.

21.0 OWNER'S EQUIPMENT

.1 This Contractor is responsible for electrical service connections to all Owner's equipment being supplied and installed in the building and that are shown in the contract documents. All Owner's equipment will be supplied complete with starters and disconnects as required.

22.0 WORK PROVIDED FOR OTHER DIVISIONS

.1 Provide information as to the exact size and location of all required concrete foundations and curbs for equipment.

.2 All bus ducts, cable tray, and conduit openings through floor, walls, and ceilings shall be sleeved 25 mm larger all around the duct, tray, or conduit. Fill the opening with 3# density acoustic media under 50% compression and seal both ends with the appropriate caulking compound. Refer to "Firestopping" specific requirements.

.3 Supply and installation of control wiring for all line voltage thermostats, for de-icing and heat trace cable.

23.0 WORK NOT INCLUDED IN THIS DIVISION

.1 Low voltage and control wiring for the mechanical equipment associated with the heating and cooling of the building will not be included in this Division.

24.0 CONDUIT AND CABLE INSTALLATION

.1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

.2 Install cables, conduits, and fittings neatly and close to building structure so furring can be kept to minimum.

.3 Conduit shall be laid out to avoid interference with other trades, and to maintain maximum headroom. Arrange conduit to conserve space, allow maintenance, and avoid crossovers where possible.

.4 Holes through exterior walls and roof shall be flashed and made completely weatherproof.

25.0 FIRESTOPPING

.1 Provide firestopping in accordance with the requirements of General Conditions.

.2 Provide fire stopping and smoke seal system materials in accordance with CAN4-S115. Materials shall be asbestos free and systems shall be capable of maintaining an effective barrier against gases, flame and smoke in compliance with CAN4-S115, not exceeding opening sizes stated and conforming to all requirements of the Standard. Fire-resistance rating of fire stopping material assembly shall meet or exceed the fire-resistance rating of the floor, wall or partition being penetrated. Acceptable manufacturers include: Fyre Shield manufactured by Tremco Ltd.,

Fyre-Sil manufactured by Tremco Ltd., Mineral Wool and FSI Silicone Sealant manufactured by FSI Engineering.

Damming and backup materials, supports and anchoring devices to manufacturer's recommendations and in strict accordance with tested assembly being installed, and as acceptable to the Authority Having Jurisdiction.

26.0 ACCESS

.1 Provide access doors for installation in walls and ceiling to service electrical equipment. Supply to appropriate trade for installation. Doors shall be ULC labelled when installed in fire separations. Wherever finish and construction allow, access doors shall be installed flush with the finished surface. Access doors shall have 16 gauge frames, 14 gauge door

panels, piano hinge, screw driver latch, and mounting channels as required for installation. Minimum size shall be 300 mm x 300 mm.

27.0 INSULATION RESISTANCE TESTING

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

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

.3 Check resistance to ground before energizing.

28.0 COORDINATION OF PROTECTIVE DEVICES

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

29.0 EXCAVATION AND BACKFILL

.1 Route of underground electrical and communication services shall be as indicated on drawings. Depth shall be minimum 1000 mm below grade unless otherwise noted.

.2 Backfill shall be machine tamped in 150 mm layers to prevent future settling.

.3 Replace existing pavement, lawn turf, concrete, etc. where damaged, or removed in connection with the installation of these underground services.

.4 Investigate location of all existing underground services which may exist in the vicinity of the new services. This contractor shall be responsible for all damage to existing services caused during excavation and backfill.

.5 Level the bottom of all trenches with a 75 mm (minimum) layer of sand. Underground cables shall be covered by a 75 mm (minimum) layer of sand prior to backfill.

.6 Install 150 mm wide green or yellow 6 mil poly ribbon approximately 300 mm above buried conductors, to serve as a warning flag.

30.0 CLEANING

.1 Complete final cleaning in accordance with the requirements of General Conditions.

.2 Protect all equipment and material from weather and the work of other trades. Remove waste periodically. Clean all materials and equipment prior to acceptance of the Work.

.3 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt. The electrical installation shall be left in a clean and finished condition, to the satisfaction of the electrical consultant.

31.0 TESTS

.1 Conduct and pay for tests of the following:

.1 Power distribution system including phasing, voltage, grounding, and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Motors, heaters, and associated control equipment including sequenced operation of systems where applicable. Take clip on ammeter readings on all phases of motor feeders, with motor operating under full load conditions. Submit test readings to electrical consultant.

.2 Furnish Manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to Manufacturer's instructions.

.3 Notify electrical consultant a minimum of 48 hours prior to test.

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

.5 Submit test results for electrical consultant’s review.

32.0 LOAD BALANCE

.1 Measure phase current to panelboards and distribution centres with all possible loads operating. Adjust branch circuit connections as required to obtain best balance of current between phases and record final measurements after adjustments have been completed. Load unbalance shall not exceed fifteen percent (15%).

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, on completion of work, a report listing phase and neutral currents on panelboards, dry type transformers, and motor control centres operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

33.0 RECORD DRAWINGS

.1 Submit record drawings in accordance with requirements of General Conditions.

.2 Obtain one set of solid white prints to be used for record work as actually installed. Record on this set, all changes associated with the work.

.3 Obtain one set of electrical drawing prints, and upon completion of the work, transcribe all information from the on-site record prints to the as-builts. Include all changes to the electrical contract including addenda, site instructions, change orders, and site conditions. Contractor shall retain the services of a qualified CAD draftsperson to transfer the as-built information from the as-built prints to an electronic digital format using the CAD software application used to produce the original drawings. Identify CAD electronic drawing files with "AS BUILT" status. Contractor shall pay all costs associated with transfer of as-built information to electronic digital format.

34.0 WARRANTY

.1 Submit a written warranty stating that all materials and workmanship will be free from defects for a period of one (1) year from date of Substantial Performance of Work. The warranty period shall not begin until:

- Electrical Operating and Maintenance Manuals are submitted and approved.

- Systems Demonstration and Training is completed and Systems Demonstration certificate is submitted.

.2 The electrical sub-contractor shall remain responsible for all electrical equipment and systems until the Electrical Operating and Maintenance Manuals are submitted and approved, and the Systems Demonstration and Training has been completed.

35.0 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into an electrical operation and maintenance manual as specified herein. The following are minimum requirements.

.2 Include in operations and maintenance data:

.1 Cover page including project name, year, name of owner, electrical consultant, and electrical contractor. Cover page shall be enclosed in a clear plastic cover.
.2 Index.
.3 Electrical Contractor's Guarantee.
.4 List of manufacturer and supplier for all items.
.5 Name, address and phone number of local suppliers for items included in Maintenance Manual.
.6 "SYSTEMS DEMONSTRATION" certificate (refer to document included in Section 26 05 01).
.7 Load Balance report.
.8 A copy of all panelboard directories.
.9 8 1/2" x 11" drawing indicating Single Line Diagram for electrical distribution system.
.10 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
.11 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items and parts lists. Advertising or sales literature not acceptable.
.12 Operating Instructions for All Systems.
.13 Motorized Gates Test Report and Verification Report (include in “Motorized Gates” section).

.3 Operation and Maintenance Data shall be contained within a 76 mm thick, black, hard cloth three ring binder. Binder shall be labelled directly on the front cover as well as the spine ("ELECTRICAL OPERATION AND MAINTENANCE MANUAL - PROJECT NAME - YEAR") with gold embossed lettering. Plastic sleeves for identification will not be accepted.

.4 The following index tabs and associated product in information shall be contained within the binder:

- Index
- Contractor Guarantee
- Manufacturer and Supplier List
- Supplier Addresses and Phone Numbers

- Systems Demonstration Certificate
- Panelboard Directories
- Load Balance Report
- Single Line Diagram
- Distribution Equipment
- Motorized Gates
- Disconnect Switches
- Panelboards and Breakers

Divider tab pages shall be laminated mylar plastic with reinforced holes. Plastic tabs with typed insertions will not be accepted.

.5 Provide three (3) operating and maintenance manuals as well as three electronic copies (CD disk containing O & M manual contents in PDF electronic format).

36.0 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with the requirements of General Conditions.

37.0 CARE, OPERATION AND START-UP

.1 Instruct owner's maintenance and operating personnel in the operation, care, and maintenance of equipment. A minimum of four (4) hours of instruction shall be provided. Provide documentation in maintenance manual confirming that instruction has been provided including description of system, owner representatives in attendance, date, and signatures.

.2 Arrange and pay for services of Manufacturer's factory service representative to supervise start-up of installation, check, adjust, balance, and calibrate components.

.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 aspects of its care and operation.

.4 Complete the "SYSTEMS DEMONSTRATION" document (Refer to document in this section) and include in maintenance manual.

.5 **The instructional training session shall be videotaped**, and one copy of the video (DVD format) shall be included with each of the maintenance manuals.

38.0 REVIEW OF WORK

.1 When the contractor is satisfied that the work is completed, and after making his own inspection of work to verify completion, the electrical contractor shall submit a written request to the electrical consultant requesting a review of work.

.2 Any deficiencies noted by the electrical consultant during the review of work, will be listed by the electrical consultant, and issued to the contractor.

.3 Such deficiencies shall be corrected within three (3) weeks of the issuance of the deficiency list, or by a mutually agreed upon date. Once complete, the contractor shall submit a written request to the electrical consultant requesting a final deficiency review.

.4 If subsequent site visits are required by the electrical consultant because the deficiencies listed were not complete, all time and expense costs incurred by the electrical consultant will be the responsibility of the electrical contractor.

.5 During construction, the electrical contractor shall make any equipment or wiring accessible for review purposes, as requested by the electrical consultant.

39.0 DEMOLITION

.1 Remove all redundant conduit and conductors to the source of supply. Where conduit is embedded in concrete or other inaccessible locations, it shall be abandoned.

.2 Boxes, fittings, equipment and accessories which become redundant shall be completely removed. All such material shall become the property of the Contractor and he shall remove it from the site. Re-useable items of electrical equipment shall be re-installed where indicated on the drawings.

.3 Remove all redundant starters, safety switches, contactors, enclosed breakers, panelboards, transformers, and other re-useable items of electrical equipment. These items shall be reinstalled where indicated on the drawings or shall be turned over to the Owner.

.4 Where existing equipment is shown to be reinstalled, only the best quality items shall be selected for re-use.

.5 The Contractor shall visit the site prior to submitting a bid to determine the amount of demolition work involved. No extras will be considered for work resulting from conditions that would have been evident upon thorough examination of the site.

.6 Contractor shall dispose of luminaire ballasts containing polychlorobiphenyl contaminants, in accordance with the latest edition of all applicable local, provincial and federal codes and standards including but not limited to the following:

Environmental Contaminants Act – Chlorobiphenyl
Regulations #1 (July 1, 1985)
Regulations #2 (August 1, 1985)

40.0 BREAKDOWN AND PRICES

.1 During the course of construction, when the Contractor is requested to submit a price for the performance of additional work, the price shall be broken down as requested by the electrical consultant to show quantity, material, and labour charges for each item.

.2 Submit the following Contract Price Breakdown to the electrical consultant within 30 days of award of the contract, and with each monthly progress claim during construction. Alternate formats for Contract Price Breakdown are not acceptable. Submit invoices to support claims for material on site, when requested.

END OF SECTION

BREAKDOWN AND PRICES

PROJECT: _____

PROGRESS CLAIM #: DATE: _____

	Contract Amount				**Amount Complete to Date**			
	Material	**Labour**	**Total**	**% of Contract**	**Material**	**Labour**	**Total**	**% Complete**
General								
Site Services								
Conduit, Outlet Boxes								
Conductors								
Devices								
Motorized Gates								
Sub Total								
Change Orders								
TOTAL								

SYSTEMS DEMONSTRATION

PROJECT: _____

DATE: _____

TIME: _____ to _____

A demonstration of electrical systems was conducted on site, to instruct owner's personnel in the operation, care, and maintenance of electrical equipment and systems.

Systems included: (indicate)

__ Motorized Gates

The following persons have witnessed this demonstration:

Owners: _____
(name) (signature)

_____
(*name) (signature)*

_____
(name) (signature)

Contractor: _____
(name) (signature)

Manufacturer’s Representative:

_____
(name) (signature)

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Wire and Cable: Section 26 05 21.

.2 Outlet Boxes: Section 26 05 32.

Part 2 Products

2.1 MATERIALS

.1 All fixture and branch wiring joints in junction and outlet boxes shall be made with a CSA certified pressure type connector rated at 600 volts maximum. Connector body shall consist of a cone shaped coil spring insert, insulated with a colour coded flame retardant, thermoplastic shell, which shall be knurled for easy grip.

.2 Lugs, terminals, and screws used for termination of conductors, shall be suitable for type of conductor used.

.3 Wire connectors to CSA C22.2 No. 65.

.4 Acceptable manufacturers: Buchanan

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten as recommended by Manufacturer as specified in CSA C22.2 No. 65. Installation shall meet secureness tests.

END OF SECTION

Part 1 General

Part 2 Products

2.1 MATERIALS

.1 Conductors: copper, sized as indicated, with 600 volt insulation rated at 90˚C. The conductor shall have PVC insulation with an overall nylon jacket (T90 or THHN), or cross-linked polyethylene insulation (R90 XLPE or RW90 XLPE).

.2 Conductor shall be stranded for sizes #10 AWG and larger.

.3 Conductors: to CSA C22.2 38.

.4 Teck cable: copper conductors sized as indicated with 600 volt insulation rated at 90°C. Chemically cross-linked thermosetting polyethylene insulation, inner jacket of polyvinyl chloride material, interlocking aluminium armour, polyvinyl chloride overall coating (FT-4 flame test rated).

Part 3 Execution

3.1 INSTALLATION – GENERAL

.1 In conduit systems in accordance with Section 26 05 34.

.2 #12 AWG shall be the minimum wire size used for branch circuits. All building conductors shall be sized to allow for a maximum of 2% voltage drop.

.3 Conductor phasing for three phase electrical distribution equipment shall be made phase A, B, C, from left to right when facing equipment. The A, B, C, phasing shall be continuous from the incoming utility supply, throughout the electrical system, including panels, motor control centres, transformers, etc. and shall continue through to all the branch circuitry to the final connection of the outlet or device. Phase colour coding shall be red, black and blue for phases A, B and C respectively (X, Y, Z sequence). Continuous colour coding of insulation is required for conductors sized #2 AWG and smaller. Colour code phase taping for conductors sized #2 AWG and smaller will not be allowed.

.4 Neutral conductors shall be white, ground conductors green, and isolated ground conductors green with yellow striped identification.

.5 Conductors drawn into conduit shall not be pulled more than 30 metres nor more than three 90˚ bends without pullboxes.

.6 Lubricant for pulling conductors shall be wax base insoluble in water and non-hardening.

.7 Conductor length for parallel feeders shall be identical.

.8 Identify all conductors (including neutral) with “Brady” marker to describe circuit number, wherever they are terminated in a junction box or panelboard.

.9 Neutral conductors shall not be derated.

.10 When changing the rotation of three phase motors, the change shall be made at the motor splice box.

.11 Switch leg conductors shall be orange in colour (including low voltage relays).

.12 Low voltage wiring shall be red, blue, and orange in colour, minimum #16 AWG, THHN.

.13 Control wiring conductors shall be red in colour (except associated building neutral conductor shall be white in colour).

.14 Ground conductors shall be green in colour A separate insulated (green) ground conductor shall be installed in each conduit system. The conduit system will not constitute an adequate ground.

.15 Install a separate insulated (green) ground conductor for each motor circuit.

.16 Insulation for all conductors installed exterior to the building shall be rated at minus 40 degrees Celsius.

.17 Circuits sharing a neutral shall be consecutive breakers in the panel (i.e. 1, 3, 5 or 8, 10, 12).

.18 Refer to Section 26 05 34 regarding installation of armoured cable.

.19 Branch wiring for emergency power supply branch circuits shall be banded with yellow identification.

END OF SECTION

Part 1 General

Part 2 Products

2.1 MATERIALS

.1 Grounding equipment to: CSA C22.2 No. 41.

.2 Copper grounding conductors to: ASA G7.1.

2.2 EQUIPMENT

.1 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 Copper compression connectors suitable for ground rod to cable and copper compression connectors suitable for cable to cable.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

.2 Clamps for grounding of conductor, (size as required) to electrically conductive underground water pipe.

.3 #3/0 Copper conductor between rod electrodes, bare, stranded, un-tinned, soft annealed.

.4 Rod electrodes, copper clad steel, 19 mm diameter by 3000 mm long. (minimum three rods spaced at 3 metres on centre)

Part 3 Execution

3.1 INSTALLATION – GENERAL

.1 Install a complete permanent continuous grounding system including electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of electrical consultant and local authority having jurisdiction over installation.

.2 Install connectors to Manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

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

.5 Soldered joints not permitted.

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

.7 Install separate insulated green ground conductor in each conduit system. The conduit system will not be considered as providing an adequate ground.

.8 Use compression connectors to attach ground conductor to ground rods.

.9 Each motor shall be provided with a separate insulated (green) ground conductor originating at the panel or Motor Control Centre from which the motor is energized.

.10 Provide 150 mm diameter plastic sleeve at each ground rod to facilitate inspection of connection at each ground rod. Sleeve shall extend 500 mm below grade, with top of sleeve extending 25 mm above grade. Cap each sleeve with plastic cap.

.11 Install a separate bonding conductor to each equipment branch circuit.

.12 Connect Gate structural steel to ground by welding copper ground conductor to steel.

3.2 GROUND ROD ELECTRODES AND GRID

.1 Install ground rod electrodes so that top of rod is 450 mm below finished grade.

.2 Use #3/0 AWG bare copper conductor to interconnect ground rod electrodes. Install interconnecting conductor in trench 500 mm below grade. Provide 150 mm bending radius in conductor at ground rod electrode connections. Provide and install copper conductor (minimum #3/0 ANG) to main distribution equipment.

.3 Install 150 mm wide warning tape over ground rod electrodes and associated interconnecting conductor, 200 mm below grade.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to the following list: Service equipment, transformers, switchgear, frames of motors, motor control centres, starters, cable trays, control panels, gate steel work, and distribution panels.

3.4 TESTS

.1 Perform tests in accordance with Section 26 05 01.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of the Electrical Consultant and local authority having jurisdiction over installation. Ground resistance to be maximum five (5) ohms prior to connections being completed at the ground grid.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Conduit, conduit fastenings, and conduit fittings: Section 26 05 34.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 Support channels, length as indicated, U-shape, size 41 mm x 41 mm, 2.5 mm thick, surface mounted or suspended.

2.2 FASTENERS

.1 Acceptable Fasteners:
- Hilti “HKD”
- Hilti “kwik” bolts
- beam clamps

2.3 MANUFACTURERS

.1 Acceptable Channel manufacturers: Burndy Ltd., Electrovert Ltd., Unistrut Ltd.

Part 3 Execution

3.1 INSTALLATION

.1 Lead anchors and plastic anchors will not be permitted.

.2 Secure equipment to poured concrete with expandable inserts.

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

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

.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.3 Clamps to secure conduit to exposed steel work.

.5 Suspended support systems:

.1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.

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

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

.8 Do not use wire lashing, tie wraps, or perforated strap to support or secure raceways or cables.

.9 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of the electrical consultant.

.10 Install fastenings and supports as required for each type of equipment cables and conduits, and to Manufacturer's installation recommendations.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Section 26 05 01.

1.2 OPERATING AND MAINTENANCE DATA

.1 Provide data for incorporation into Electrical Maintenance Manual specified in Section 26 05 01.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Junction and pull boxes: to CSA C22.2 No. 40, welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

2.2 SPLICE BOXES

.1 Splice boxes used shall be weatherproof, rodent and insect resistant, and sealed at all entries and exit locations.

.2 Splice boxes underground shall be suitable for such use and prevent entry of any foreign material into box.

Part 3 Execution

3.1 JUNCTION AND PULL BOXES

.1 Install junction and pull boxes in accessible locations.

.2 Support boxes independently of connecting conduits. Secure boxes to building structure.

.3 Extension rings will not be allowed on junction or pullboxes.

.4 Only main junction and pull boxes are indicated. Provide pull boxes so as not to exceed 30 meters of conduit run between pull boxes.

3.2 SPLICE BOXES

.1 Install splice boxes as required at gate locations to extend cabling. Boxes shall be installed underground or in secure locations out of reach of clients.

.2 Wiring within splice boxes shall be shrink wrapped in weatherproof material and not be susceptible to foreign material.

3.3 IDENTIFICATION

.1 Junction and pull boxes, with size 2 identification labels indicating system name, ampacity, voltage and phase in accordance with Section 26 05 01.

.2 Identify all 100 mm square or 100 mm octagon junction boxes, containing branch circuit conductors, with black felt marker indicating panel and breaker number (i.e. “B-24”).

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Electrical General Provisions: Section 26 05 01.

Part 2 Products

2.1 SHEET METAL BOXES

.1 All octagon boxes shall be hot dipped galvanized steel, minimum 100 mm in diameter #54151. All 100 mm square boxes shall be minimum 40 mm deep #52151. Deep boxes #52171 shall be installed where specified and where six or more conductors enter the box.

.2 Device boxes shall be minimum 64 mm deep (#1104).

2.2 CAST BOXES

.1 All exterior outlet boxes shall be cast aluminum with female threaded hubs suitable for surface or recessed mounting as shown and required. (Crouse Hinds FS series)

2.3 PVC BOXES

.1 PVC outlet boxes shall be CSA approved, two gang with gaskets cover unless otherwise stated. Size and quantity of knockouts shall be coordinated with conduit entrances.

.2 PVC boxes and fittings to: CSA C22.2 No. 85.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits. Secure outlet boxes to building structure.

.2 Fill boxes with paper to prevent entry of construction material.

.3 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers not allowed.

.4 Boxes installed in exterior stud walls shall be surrounded with a "poly pan" vapour barrier box prior to mounting. Openings through poly wrap for cables or conduit shall be sealed with caulking by this contractor prior to installation of wallboard. The "poly pan" vapour barrier box shall be installed with stud strapping supports on all four sides, so that a bead of caulking may be compressed between the poly pan flange and the wallboards. The stud strapping supports shall be installed by the framing contractor.

.5 Extension rings shall **not** be utilized to accommodate conductor fill requirements.

.6 Where 25 mm conduit is utilized, outlet boxes must be minimum 119 mm (4 11/16") square.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Fastenings and Supports: Section 26 05 29.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83. EMT shall be thin-walled electroplated steel.

.3 Flexible metal conduit and liquid-tight flexible metal conduit: to CSA C22.2 No. 56.

.4 Rigid PVC conduit: sized as indicated on drawings to CSA C22.2 No. 211.2.

2.2 CONDUIT FASTENINGS

.1 One hole galvanized steel straps to secure surface conduits 50 mm and smaller. Use two hole galvanized 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 the following maximum spacings:

1500 mm for 13 mm and 19 mm conduits
2000 mm for 25 mm and 32 mm conduits
3000 mm for 40 mm and larger conduits

.4 6 mm diameter threaded rods to support suspended channels.

.5 Conduit clamps for conduits on channels.

2.3 CONDUIT FITTINGS

.1 Fittings for raceways: to CSA C22.2 No. 18.

.2 Fittings manufactured for use with conduit specified.

.3 Factory "ells" where 90 degree bends are required for 19 mm and larger conduits.

Part 3 Execution

3.1 INSTALLATION

.1 Drawings do not show all conduits. Those shown are in diagrammatic form. Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in unfinished areas and concealed ceiling spaces.

.3 Use rigid conduit for all above ground exterior work.

.4 Use rigid P.V.C. underground or in concrete slabs only. PVC conduit is not acceptable above floor slab.

.5 Use flexible non-metallic tubing in concrete slabs only. Flexible non-metallic tubing is not acceptable above concrete floor slab (adapt to EMT).

.6 Bend conduits cold, so that conduit at any point is not flattened more than 1/10th of its original diameter. Consider conduits bent more than this or kinked as defective and replace.

.7 Mechanically bend steel conduit over 19 mm diameter.

.8 Field threads on rigid conduit shall be sufficient length to draw conduits up tight.

.9 Provide polypropylene pull cord in empty conduits to facilitate pulling wiring in future.

.10 Where conduits become blocked, use of corrosive agents is prohibited. Remove and replace blocked section.

.11 Dry conduits out thoroughly before installing wire.

.12 Conduits shall not pass through structural members without the knowledge and consent of the structural consultant.

.13 Locate conduits not less than 75 mm parallel to steam or hot water lines with a minimum of 25 mm at crossovers.

.14 All conduit connectors shall be complete with a nylon insulated throat wherever conduit terminates in an outlet or junction box.

.15 Conduit shall be secured to building structure. Do not fasten conduit to suspended ceiling or its support.

.16 Run conduit parallel or perpendicular to building lines, when installed exposed or in ceiling spaces.

.17 Locate conduits a minimum of 1.5 metres from infrared or gas fired heaters.

.18 Conduits to be run in flanged portion of structural steel.

.19 Group conduits wherever possible on surface channels.

.20 Install CSA approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints. Provide offsets in conduit adjacent to building expansion joints, where conduit is installed above suspended ceilings.

.21 Conduits installed between heated and unheated spaces shall be sealed internally with a silicone sealant at the wall between the two spaces.

.22 A minimum of one expansion joint shall also be installed in each 3000 mm length of PVC conduit installed on the exterior of the building.

3.2 CONCEALED CONDUITS

.1 Horizontal runs are not permitted in masonry walls.

.2 Conduits are not permitted in terrazzo or concrete toppings.

3.3 CONDUITS IN POURED CONCRETE

.1 Locate to suit reinforcing steel. Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Provide sleeves in advance of concrete pour where conduits pass through slab or walls.

.4 Do not use EMT conduit in concrete slabs in contact with the earth.

.5 Where conduits pass through waterproof membrane provide oversize sleeve before membrane is installed. Use cold mastic between sleeve and conduit.

.6 Conduits to be completely encased in concrete.

3.4 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Thoroughly waterproof joints (PVC excepted) with a heavy coat of bituminous paint.

3.5 IDENTIFICATION

.1 Refer to General Provisions – Conduit and Cable Identification: Section 26 05 01.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 General inspection of all electrical equipment.

.2 Specific equipment testing as specified herein or in other sections of the specifications.

.3 Power Distribution System testing including insulation resistance testing, load balance, and voltage testing.

.4 Building Systems testing.

.5 Submittal of test reports.

.6 Instruction for the Owner's staff in the cleaning, maintenance and operation of the building systems, equipment, and finishes.

Part 2 Products

.1 Provide all instruments, meters, and equipment required to conduct tests during and at the conclusion of the project.

Part 3 Execution

3.1 GENERAL EQUIPMENT INSPECTION

.1 Visually inspect all equipment delivered to the site, to identify damage due to transportation, handling, or placing into position. Verify the content of the equipment with the bill of material and note any missing items. Document all defects or damage noted and submit to the Electrical Consultant.

.2 Check all bus connections, wiring, and other joints that are made at equipment shipping splits and ensure that the equipment sections are properly bolted together.

.3 Ensure that the equipment is clean and free of debris before proceeding with testing or energization of the equipment.

.4 Verify the phasing connections of the incoming and / or outgoing connections to the equipment.

.5 Visually check air gap and surface clearances, phase to phase and phase to ground. Document any clearances that appear to be below the CSA standard for the equipment.

.6 Ensure that ground connections are provided to C.E.C. requirements and as specified.

3.2 INTERRUPTER SWITCHES AND FUSES

.1 Check the switch for any physical damage, inspect all insulators and barriers, and ensure that the switch is properly lubricated.

.2 Check fuse mounts, clamps, and holders for tightness and alignment.

.3 Operate the switch and check safety interlocks for proper operation.

3.3 DISTRIBUTION SYSTEM ELECTRICAL TESTING

.1 Take voltage readings at all power distribution points including distribution panels and lighting panelboards.

.2 Insulation Resistance Testing

.1 Megger test all branch circuits, feeders, and equipment buswork prior to energization. Insulation resistance shall conform to the requirements of the Canadian Electrical Code, the local inspection authority, and the Electrical Consultant.

.a Test circuits and equipment rated up to 350 volt with a 500 volt instrument.

.b Test 350 to 600 volt circuits and equipment with a 1000 volt instrument.

.2 Insulation resistance less than 1.0 Megohm on any circuit, feeder, or equipment shall be considered unacceptable. Clean, dry out, or replace equipment until acceptable resistance is achieved.

.3 Load Balance

.a Measure phase current to panelboards and distribution centres with all possible loads operating. Adjust branch circuit connections as required to obtain best balance of current between phases and record final measurements after adjustments have been completed. Load unbalance shall not exceed fifteen percent (15%).

.b Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.c Submit, on completion of work, a report listing phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

3.4 TEST REPORTING

.1 Submit general equipment inspection report to confirm that equipment has been tested and noting any damage or defects.

.2 Submit distribution system electrical test reports including:

- insulation resistance test results for all feeders and equipment except for 120/208 volt branch circuit wiring.
- power distribution system voltage readings
- load balance readings.

3.5 MOTORIZED GATES

.1 Assist with the manufacturer's representative with the verification and testing of the motorized gates installed in this contract.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 01.

.2 Include time-current characteristic curves for breakers with ampacity of 400 and over.

1.2 OPERATION AND MAINTENANCE DATA

.1 Provide data for incorporation into Electrical Maintenance Manual specified in Section 26 05 01.

Part 2 Products

2.1 BREAKERS - GENERAL

.1 Moulded case circuit breakers: to CSA C22.2 No. 5.1

.2 Bolt-on moulded case circuit breaker, quick-make, quick break type, for manual and automatic operation.

.3 Common-trip breakers with single handle for multi pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when the value of current reaches setting. Trip settings on breakers with adjustable trips to range 3 - 10 times current rating.

.5 Breakers shall trip to "centre" position.

.6 All breakers rated at more than 400 amps shall be electronic type with adjustable trip units with adjustable protection settings for long-time pickup, long-time delay, short-time pickup, short-time delay, and instantaneous.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping under overload conditions and instantaneous magnetic tripping for short circuit protection.

2.3 SOLID STATE TRIP BREAKERS

.1 Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, and instantaneous tripping for phase and ground fault short circuit protection.

2.4 BREAKER ENCLOSURES

.1 Breaker enclosures shall be surface mounted unless otherwise noted. The breaker shall be capable of being padlocked either in the "ON" or "OFF" position.

2.5 MANUFACTURERS

.1 Acceptable Manufacturers: Schneider Canada, Siemens Canada Ltd., Eaton Cutler Hammer Canada Ltd., General Electric Industrial Systems, or approved equivalent.

Part 3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 01

.2 Drawings shall include rating and enclosure dimensions.

1.2 OPERATIONS AND MAINTENANCE DATA

.1 Provide data for incorporation into Electrical Maintenance Manual specified in Section 26 05 01

1.3 RELATED WORK SPECIFIED ELSEWHERE

.1 Fuses - Low Voltage - Section 26 28 13.

Part 2 Products

2.1 EQUIPMENT

.1 Enclosed manual air break switches in non-hazardous locations: to CSA C22.2 No. 4-M1985.

.2 Fuseholder assemblies: to CSA C22.2 No. 39.

.3 Fusible and non-fusible disconnect switch in CSA Enclosure 1 as indicated.

.4 Provision for padlocking in "OFF" switch position.

.5 Mechanically interlocked door to prevent opening when handle in 'ON' position.

.6 Fuseholders in each switch suitable without adaptors, for type of fuse as indicated.

.7 Quick-make, quick-break action.

.8 ON-OFF switch position indication on switch enclosure cover.

.9 Fusible and non-fusible disconnect switch shall be complete with solid neutral lug assembly.

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses as indicated.

.2 Mount securely at 1800 mm above finished floor to top of switch. Provide a minimum of 1000 mm clear floor space in front of the switch.

3.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01.

.2 Nameplate for each disconnect switch Size 5 engraved in accordance with Section 26 05 01. Indicate disconnect load, amperage, voltage, and phase (i.e., rooftop unit, 60 amp, 120/208V, 3 phase).

.3 Identify circuit number on disconnect switch (i.e. “B-36”).

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

Part 2 Products

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed 5 times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.2 Reclaimed asphalt pavement.

.3 Reclaimed concrete material.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

.3 Light weight aggregate, including slag and expanded shale.

.4 Reclaimed asphalt pavement.

.5 Reclaimed concrete material.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative 4weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CSA-A23.2-, Methods of Test for Concrete.
- .2 CAN/CSA-G30.18-, Billet Steel Bars for Concrete Reinforcement.
- .3 CSA-G40.21-, Structural Quality Steel.
- .4 CAN/CSA-S16.1-, Limit States Design of Steel Structures.
- .5 CSA W48-, Filler Metals and Allied Materials for Metal Arc Welding.

1.2 SHOP DRAWINGS

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

1.3 SOILS REPORT

.1 A copy of the geotechnical investigation is available at the Consultant's office for information purposes only.

.2 The test boring data and the information given in soils report is believed to be correct and is given for the assistance of the Contractor, who shall be solely responsible for any interpretation which he may place on this information.

.3 No warranty is made by the Owner to information contained in this report.

.4 Should sub-surface conditions be found to vary substantially from those indicated in the Soils Report, notify the Consultant immediately

1.4 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Reinforcing steel: to CAN/CSA-G30.18 and in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 Steel casing: to ASTM A36/A36M .

Part 3 Execution

3.1 FIELD RECORDS

.1 Maintain drilling record for each pile, including:

depth of pile, cut-off elevation, date and time of casting, reinforcing, size and length

.2 Provide Consultant with copy of records.

3.2 INSTALLATION

.1 Bore holes to diameters and depths as indicated

.2 Protective steel casing:

.1 Where required, use steel protective casing. Ensure penetration of casing to required depths either by self mass or driving.

.3 Dispose of excavated materials.

.4 Testing agency to inspect pile excavation prior to placing of concrete. Remove loose material, foreign matter and water.

.5 Install steel reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing and as indicated.

.6 Fill pile excavations with concrete to elevations as indicated. Place concrete in one continuous pour in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.7 Where required by ground conditions, the holes shall be sleeved with steel casing, minimum 5 mm. thick, to ensure a clean open hole. Where the soil is insufficiently stable to maintain a vertical shaft without sloughing in, the steel sleeve shall remain in position until the hole has been dewatered, reinforcing steel has been set in position and concrete is about to be placed in the hole. The casing shall be withdrawn at such a time and in such a manner as to prevent ground water or soil from entering the hole.

.8 The Contractor shall include in his bid for all steel sleeving required for the installation of the piles.

.9 All holes, whether sleeved or not, shall be dewatered before any concrete is placed therein.

.10 All piles shall be installed in one continuous pour to finished pile cut-off elevation. Where the pile projects above ground level the pile projection shall be formed using removable steel casing or Sonotube forms not smaller in diameter than that of the pile.

.11 Remove boulders as required and continue pile to specified depth. If boulders cannot be removed with reasonable effort, notify Consultant immediately. Changes to pile design or locations must be approved by the Consultant in writing.

.12 Where steel protective casing is left in place, fill void space between casing and shaft excavation with concrete.

3.3 PLACING REINFORCING STEEL

.1 Reinforcing steel shall be placed immediately prior to concrete placing and the steel shall be securely held to maintain position during concrete placing and until the concrete has hardened. Place reinforcing in such a manner as to prevent loose earth or debris from falling into the hole.

.2 No splices in reinforcing steel shall be permitted unless specifically shown on the drawings or approved by the Consultant. Where such splices are permitted, they shall be a minimum of 36 bar diameters and splices in adjacent bars shall be staggered.

.3 Minimum cover to all pile reinforcing including ties shall be 75 millimeter or as called for on drawings.

.4 Ties or spiral reinforcing shall be securely wired to main reinforcing at each bar intersection. No tack welding of reinforcing cages will be permitted. Provide additional reinforcing bars as required to securely brace the reinforcing steel cage.

.5 Care shall be taken to clean all form oil or other deleterious substances from the reinforcing steel.

3.4 PLACING CONCRETE

.1 Concrete shall be handled to the place of final deposit in such a manner as to prevent segregation of the concrete.

.2 Concrete shall be placed continuously as soon as possible after the hole has been drilled, cleaned out and reinforcing steel has been secured in position. Every care shall be taken to ensure that the hole is completely filled with concrete.

.3 Concrete in the piles shall be compacted by the use of high frequency vibrators. The vibrator shall be lowered down the drilled holes, applied directly to the concrete and gradually withdrawn as the concrete placing progresses. Personnel experienced in vibrating concrete shall be used on this work and care shall be taken not to over-vibrate.

.4 Protect concrete from rain, frost or snow during and after placing until the concrete has hardened.

.5 Immediately after the concrete pouring is completed, clean all projecting reinforcing steel.

3.5 TOLERANCES IN PILE SIZE, LOCATION AND ALIGNMENT

.1 The maximum permissible error in location at cut-off shall be 40 millimeters in any direction. All piles shall be placed not more than two percent of their lengths out of plumb. The elevation of the top of all piles shall be within 25 millimeters of the elevation called for on the structural drawings. All reinforcing steel clearances shall be within a tolerance of + 12 millimeters of the dimension called for on the drawings.

.3 The minimum diameter of all piles shall be as called for on the drawings.

.4 Where piles have been placed outside the above tolerances, such piles may be rejected by the Consultant. The Contractor shall place additional piles and pile caps as directed by the Consultant to replace rejected piles and such additional piles and pile caps shall be installed at not additional cost to the contract.

.5 The pile lengths called for on the drawings are the minimum lengths required below the pile cut-off elevations shown on the drawings.

3.6 COLD WEATHER REQUIREMENTS

.1 When the air temperatures are below 5°C., care shall be taken to keep forms and reinforcing steel free from ice.

.2 Provision shall be made to protect the concrete from rain or snow while placing and after placing, until the concrete has hardened.

.3 Where piles are drilled through frozen ground, enlarge the pile diameter by 100 mm for that portion of the pile.

3.7 PILE SHAFT ENCLOSURES

.1 All pile holes are to be protected with an enclosure, acceptable to the Consultant.

3.8 SITE CLEAN-UP

.1 Leave the site neat, tidy, free of plant and/or equipment and in safe condition. Remove excavation material from site or deposit on site as directed by the Consultant.

3.9 DEFECTIVE PILES

.1 Correct as directed all piles not meeting requirements of this specification at no additional cost to the contract.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Association of State Highway and Transportation Officials (AASTHO)

.1 AASHTO T245-97-UL-2004, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

Part 2 Products

2.1 MATERIALS

.1 Representative samples of each asphalt paving mixture proposed for use on Project.

2.2 EQUIPMENT

.1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall Immersion Test are suitable for test.

.2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.

.3 Flat transfer plates of glass or metal. Keep 1 plate under each specimen during immersion period and during subsequent handling, except when weighing and testing, to prevent breakage or distortion of specimens.

.4 Apparatus required to conduct Marshall Immersion Test.

Part 3 Execution

3.1 PREPARATION

.1 Prepare at least 8 specimens for each test with hand-operated hammer, in accordance with AASHTO T245-97-UL, except where specified otherwise.

3.2 TEST PROCEDURE

.1 Do Marshall testing to AASHTO T245-97-UL.

.2 Weigh each specimen in air and in water. Weigh in water as rapidly as possible to minimize absorption.

.3 Calculate specific gravity of each specimen as follows:

.1 Specific Gravity = A / A-B

.2 Where A = weight of specimen in air in grams

.3 B = weight of specimen in water in grams

.4 Sort each set of 8 specimens into 2 groups of 4 specimens each so that average specific gravity of specimens in group 1 is essentially same as that of group 2.

.5 Test group 1 specimens for Marshall stability. Calculate S1 = Marshall stability of group 1 (average).

.6 Immerse group 2 specimens in water for 24 hours at 60 degrees C, then test immediately for Marshall stability. Calculate S2 = Marshall stability of group 2 (average).

3.3 CLOSEOUT ACTIVITIES

.1 Report test results to Departmental Representative.

.2 Report numerical index of retained stability as resistance of asphaltic paving mixtures to detrimental effect of water, expressed as percentage of original stability retained after immersion period.

.3 Calculate index as follows:

.1 Index of Retained Stability = S2 / S1 x 100.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM D140/D140M-09, Standard Practice for Sampling Bituminous Materials.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt tack coat and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

.1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 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 asphalt tack coats from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Deliver, store and handle materials in accordance with ASTM D140.

.5 Provide, maintain and restore asphalt storage area.

.6 Packaging Waste Management: remove for reuse by manufacturer of packaging materials, pallets, padding, and crates, in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 MATERIALS

.1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1.

.2 Water: clean, potable, free from foreign matter.

2.2 EQUIPMENT

.1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.

.2 Pressure distributor:

.1 Designed, equipped, maintained and operated so that asphalt material can be:

.1 Maintained at even temperature.

.2 Applied uniformly on variable widths of surface up to 5 m.

.3 Applied at readily determined and controlled rates from 0.2 to 5.4 L/m2with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m2.

.4 Distribute in uniform spray without atomization at temperature required.

.2 Equipped with meter, registering travel in metres per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.3 Equipped with pump having flow metre graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.

.4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.1 Measure temperature to closest whole number.

.5 Equipped with accurate volume measuring device or calibrated tank.

.6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

.7 Equipped with nozzle spray bar, with operational height adjustment in increments of 0.6 metres and capable of being raised or lowered.

.8 Cleaned if previously used with incompatible asphalt material.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt tack coat installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 APPLICATION

.1 Apply asphalt tack coat only on clean and dry surface.

.2 Dilute asphalt emulsion with water at 1:1ratio for application.

.1 Mix thoroughly by pumping or other method approved by Departmental Representative.

.3 Apply asphalt tack coat evenly to pavement surface according to manufacturer's written instructions.

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.5 Apply asphalt tack coat only when air temperature greater than 10 degrees C and when rain is not forecast within 2 hours minimum of application.

.6 Apply asphalt tack coat only on unfrozen surface.

.7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.9 Keep traffic off tacked areas until asphalt tack coat has set.

.10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.11 Permit asphalt tack coat to set before placing asphalt pavement.

.12 Submit summary report within 7 days minimum of date of application and include information as follows:

.1 Total area tack coated.

.2 Quantity of tack coat used.

.3 Mean application rate.

.4 Actual product quantity used when using equipment on pressure distributors.

.5 Dipstick measurements or electronic printouts are acceptable.

.13 Carry out measurements in presence of Departmental Representative upon request.

.14 Inspect tack coat application to ensure uniformity.

.1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Departmental Representative.

.2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

3.3 CLEANING

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

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

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

.3 Waste Management: separate waste materials for reuse in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 (No. 200) mm Sieve in Mineral Aggregates by Washing.

.3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.

.4 ASTM C127-07, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.

.5 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.6 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.7 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.8 ASTM D1559-89, Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

.9 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.10 ASTM D3203-05, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.11 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 Asphalt Institute (AI)

.1 AI MS-2-94, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

.2 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt paving mix, aggregate, and coatings and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect aggregate from damage.

.3 Replace defective or damaged materials with new.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of crates, packaging materials, pallets, padding, as specified in Construction Waste Management Plan in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Asphalt concrete aggregates:

.1 Coarse aggregate is aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C117.

.2 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.

.3 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.4 Aggregate: material to Section 31 05 16- Aggregate Materials and following requirements:

.1 Crushed stone or gravel.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing
	Asphalt Concrete
200 mm	-
75 mm	-
50 mm	-
38.1 mm	-
25 mm	-
19.0 mm	100
12.5	-
9.5 mm	60-80
4.75 mm	40-65
2.00 mm	30-50
0.425 mm	15-30
0.180 mm	5-20
0.075 mm	3-8

.4 Sand equivalent: to ASTM D2419, Minimum 50.

.5 Magnesium Sulphate soundness: to ASTM C88. Max % loss by weight: coarse aggregate 12, fine aggregate 16.

.6 Los Angeles Degradation: to ASTM C131. Max % loss by weight: coarse aggregate, 35.

.7 Absorption: to ASTM C127. Max % by weight: coarse aggregate, 1.75.

.8 Lightweight particles: to ASTM C123. Max % by mass, with less than 1.95. Relative density (formally Specific Gravity): 1.5.

.9 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max % by weight: coarse aggregate, 15.

.10 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 1freshly fractured face. Material to be divided into ranges using methods of ASTM C136.

.11 Table:

Passing	Retained on	
19 mm	to	9.5 mm
9.5 mm	to	4.75 mm

.12 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.2 Mineral filler for asphalt concrete:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Departmental Representative to improve mix properties.

.3 Asphalt cement: to CAN/CGSB-16.3

.4 Asphalt tack coat: to Section 32 12 13.16- Asphalt Tack Coats

2.2 EQUIPMENT

.1 Pavers: mechanical self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers for parking lots and driveways:

.1 Minimum drum diameter: 750 mm.

.2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.

.4 Haul trucks: of sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.1 Boxes with tight metal bottoms.

.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.5 Suitable hand tools.

2.3 MIX DESIGN

.1 Mix design to AI MS-2.

.2 Job mix formula to be approved by Departmental Representative.

.3 Design of mix: by Marshall method to requirements below:

.1 Compaction blows on each face of test specimens: 50.

.2 Mix physical requirements:

Property	Concrete
Marshall Stability at 60 degrees C, kN minimum.	5.5
Flow Value, mm.	2-4
Air Voids in Mixture, %	3-5
Voids in Mineral Aggregate, % minimum	15
Index of Retained Stability, % minimum	75

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to ASTM D1559.

.2 Air voids: to ASTM D3203.

.3 Voids in mineral aggregate: to AI MS-2, chapter 4.

.4 Index of Retained Stability: measure in accordance with Section 32 12 10- Marshall Immersion Test for Bitumen.

.4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be approved by Departmental Representative.

.5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 ASPHALT TACK COAT

.1 In accordance with Section 32 12 13.16- Asphalt Tack Coats.

3.3 PLANT AND MIXING REQUIREMENTS

.1 In accordance with ASTM D995.

3.4 ASPHALT CONCRETE PAVING

.1 Obtain written approval of tack coat from Departmental Representative before placing asphalt mix.

.2 Place asphalt mix only when base or previous course is dry and air temperature is above 5 degrees C.

.3 Place asphalt concrete in compacted layers not exceeding 50 mm.

.4 Minimum 135 degrees C mix temperature required when spreading.

.5 Maximum 160 degrees C mix temperature permitted at any time.

.6 Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.

.7 Compact parking lot and driveway asphalt concrete to density not less than 95% of density obtained with Marshall specimens prepared in accordance with ASTM D1559 from samples of mix being used. Roll until roller marks are eliminated.

.8 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.

.9 Moisten roller wheels with water to prevent pick up of material.

.10 Compact mix with hot tampers or other equipment approved in writing by Departmental Representative, in areas inaccessible to roller.

.11 Finish surface to be within 10 mm of design elevation and with no irregularities greater than 10 mm in 4.5 m.

.12 Repair areas showing checking, rippling or segregation as directed by Departmental Representative.

3.5 JOINTS

.1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.

.2 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.3 For cold joints, cut back to full depth vertical face and tack face with hot asphalt.

.4 For longitudinal joints, overlap previously laid strip with spreader by 25 to 50 mm.

3.6 CLEANING

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

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

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

.3 Waste Management: separate waste materials for reuse in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

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

3.7 PROTECTION

.1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38 degrees C.

.1 Do not permit stationary loads on pavement until 24 hours after placement.

.2 Provide access to buildings as required.

.1 Arrange paving schedule so as not to interfere with normal use of premises.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 The work in this section shall include furnishing all labor, materials, equipment and appliances necessary to complete all enclosed drive motorized sliding gate(s) suited for detention applications and as required for this project in strict accordance with this section of specifications and drawings.

.2 All detention motor box locks shall be shipped with a construction core and one key code for construction only. Installation contractor shall review specific key code requirements with facility to furnish facility specific lock cylinders, related lock hardware and keys to meet key code requirements.

1.2 REFERENCES

.1 American Welding Society

.1 AWS D1.1 / D1.1M Structural Welding Code

.2 ASTM International

.1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Include details of construction relative to materials, dimensions of individual components, and gate. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:

.1 Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.

.2 Motors: Indicate nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.

.3 Detailed description of operation.

.2 Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer’s data sheets.

.1 Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by gate operator manufacturer and those provided by others.

.2 Foundation details for gate system.

1.4 CONTRACT CLOSEOUT SUBMITTALS

.1 Refer to Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data for each Gate Type: Deliver 3 copies of instructions for operation, maintenance, recommendations, and parts manuals covering the installed products to the Departmental Representative. Include name, address and telephone number of nearest fully equipped service organization.

1.5 MAINTENANCE

.1 Spare Parts: Furnish the following and store at the site where directed:

.1 Sliding Gate – Mechanical: One reduction gear assembly, one full-length chain and repair links and one crank handle.

.2 Sliding Gate – Electrical: one motor, two limit switches, four limit nuts, one relay overload, two relay motor OPEN/CLOSE-solid state, one transformer, one circuit board-VS, one disconnect switch 30 amp, thermostat, one status/limit switch and one heater gearbox immersion.

.2 Required amounts of recommended lubricants for 3 years of service.

1.6 CERTIFICATIONS

.1 The steel factory welders must be certified per Article 2.1.1.2.

Part 2 Products

2.1 VEHICLE SLIDING GATE LOCKING SYSTEM

.1 Manufacturer:.

.1 Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification Record to insure conformance with the AWS D1.1 welding code. Individual Certificates of Welder Qualification documenting successful completion of the requirements of the AWS D1.1M code shall also be provided.

.2 System Dimensions:

.1 Each overhead locking system shall have a clear opening height and clear opening width as shown on the detail drawings.

.3 System Functions:

.1 System is designed to operate overhead sliding locking device.

.2 System shall be designed so that gate movement from the closed position is impossible except by electric or mechanical means.

.4 Variable Speed-Rate of Travel:

.1 The vehicle locking system shall have the ability to achieve a maximum gate speed of 610 mm per second, and shall be equipped with soft-start and soft-stop function to prevent shock load to the gate panel and locking system. Gate speed shall be adjustable and as selected by the facility at the project site.

.5 Motor:

.1 Motor Size: The electrical motor shall be 1 HP, 208VAC, 3 Phase as produced by a nationally recognized manufacturer.

.2 AC Drive: The variable frequency drive unit shall allow for programmable speeds and programmable soft-start and soft-stop features.

.3 Overload Protection: Motors shall be protected against overload by either a thermal or a current sensing overload device.

.4 Gear (Box) Reducer: The self-enclosed gear-head gearbox shall be manufactured as a single unit, and shall consist of hardened steel, machine cut worm and mating bronze gear running in oil bath. Oil shall be #634 specialty oil with a fluid pour point of –42 degrees C. The gearbox shall perform the following functions:

.1 Adjustable Clutching Device.

.1 If an obstruction stops the gate, the operator will stall and then either:

.1 Reverse a few inches and stop, or

.2 Reverse to the fully opposite direction and stop.

.3 This function is field programmable.

.4 The gate must be restarted from the controls to resume movement in the selected direction.

.2 Whenever a door is stopped in any intermediate position, it shall be possible to manually move the door to the full open or full closed position.

.3 The door will only automatically deadlock in the fully closed position.

.2 Manual disconnect by crank handle.

.5 Gear Box Heater: Operator shall include internal gearbox heater and a heater strip for the control box.

.6 Manual Operation: A crank handle, located at ground level in the motor box, shall provide a two-step emergency procedure for manual operation:

.1 Unlock and open motor-box door.

.2 Fold out handle and crank gate opened or closed.

.7 Limits: The operator shall be equipped with an integral limit system, providing accurate settings to control the open and close positions of the gate, and shall not be affected by manual operation or motor removal.

.8 Control Circuit: U.L. listed operator shall have 5v dc controls.

.9 Control wiring: The electrical contractor shall supply all exterior control wiring.

.10 Audio Alarm: This alarm shall have a dual function.

.1 The first function shall be as a warning prior to gate movement. When the motor control board recognizes a command, this alarm shall be activated three (3) seconds before the motor is energized and the gate begins to move. This shall be continuously activated while the gate is in motion.

.2 For UL Class IV operation only, the audio alarm shall be an entrapment notification alarm. This alarm shall sound as a result of a second activation of the external primary entrapment prevention device before an end limit (open or close) is reached. The pulsing rate of the alarm in the entrapment notification mode shall be faster than the pulsing rate when in the warning mode prior to gate movement.

.11 Main Power Disconnect Switch and Wiring Compartment: When this switch is in the OFF position, the main power shall be disconnected from the Variable Speed Drive, Motor Control Board and power transformer(s).

.12 Speed: The gate operator speed shall be fully programmable allowing a maximum speed of 610 mm per second.

.13 Transformer: Operators shall have an isolated low voltage (24V) secondary circuit supplied by a Class II transformer (minimum of 40va) to provide separate power for external control devices.

.14 Terminations: all terminations to be on terminal strips and to be labelled.

.6 Motor Housing:

.1 Water Resistant Motor Box: The motor box shall be constructed of 10-gauge sheet steel, hot-dip galvanized per ASTM 123, gasketed and located at ground level for easy maintenance.

.2 Security Hinges and Tamper Resistant Security Screws: Security hinges and screws shall be furnished to secure operator enclosure components.

.3 Motor Box: Provide Open and Close switches inside box for maintenance of the sliding gate.

.4 Motor Box Lock: Motor box shall be locked with a prison dead bolt. Three (3) paracentric keys shall be provided per construction key code as noted in Part 1.

.7 System Components:

.1 Track:

.1 Overhead track shall consist of two 254 mm structural steel channels joined together as shown on the drawings, weighing a minimum of 55kg/m.

.2 All individual welders shall be tested to conform with AWS D1.1 / D1.1M structural welding code - steel. The manufacturer shall provide individual qualification test records.

.2 Trolley: Heavy duty wheels shall be milled from a single block of hardened stainless steel and use 2 sealed ball bearings per wheel, 6 wheels per trolley.

.3 Bottom Guides: Bottom guides on plates: bottom guides shall be constructed of 9.525 mm x 63.5 mm flat steel, welded to a 6 mm x 127 mm x 254 mm steel plate, shall be lagged to the concrete footing or as otherwise specified for vehicle crash gates.

.4 Locking Column: The locking column is constructed of a W5 x 19 “H” beam with a depth of 127 mm, a removable steel cover and secured with security screws.

.1 Contractor to confirm locking column is sized correctly to suit the sliding gate panel.

.5 Locking Tangs: Three locking tangs to be affixed to the leading edge of the gate panel to provide positive locking into the locking column.

.6 Posts: Double set of support posts shall be minimum 102 mm galvanized steel with concrete foundation as indicated on structural drawings.

.7 Drive Chain: Drive chain shall be #60 roller chain.

.8 Gate Guide Angle: Gate guide angle shall consist of a 63.5 mm x 38 mm x 6.4 mm steel angle attached to the bottom of the gate panel running its full length or as otherwise specified for vehicle crash gates.

.8 Solid Gate Panel:

.1 Solid gate panel shall be manufactured with galvanized steel tube meeting the requirements shown on the drawings. Gate frame shall be fabricated in two sections (top and bottom) and shall be field welded to form a single rigid panel.

.2 Outer Support Members: Galvanized steel tube 76 mm x 51 mm x 6.4 mm around perimeter of each half of solid gate panel.

.3 Inner Support Member: Galvanized steel tube 76 mm x 51 mm x 6.4 mm full height of the panel and spaced as shown on drawings.

.4 Top and bottom sections of the panel shall be connected by a sleeve factory welded to the inside of each vertical tube of the upper section, and fitting tight into the inside of each vertical tube of the lower section. Sleeve to extend 102 mm into the upper and lower section tubes.

.5 Solid Gate Panel Faces: Face sheets to be 2.7 mm thick (12 gauge) galvanized sheet steel spot welded to HSS members. Fabricate each sheet to overlap support members by 51 mm.

.6 Provide access ports in face sheets to allow for installation and adjustment of hanger bolts. Access port covers to be 2.7 mm thick (12 gauge) galvanized sheet steel secured at all corners with Torx-with-pin security screws.

.9 Chain Link Panel:

.1 Chain link gate panel shall be manufactured with galvanized steel tube to ASTM A53/A53M and meeting the requirements shown on the drawings.

.2 Outer Support Members: Galvanized steel tube 73 mm outside diameter around perimeter of chain link panel.

.3 Inner Support Member: Galvanized steel tube 73 mm outside diameter and spaced as shown on drawings.

.4 Chain Link Gate Panel Fabric: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

.1 Height of fabric: as indicated.

.2 Tension bars: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

.5 Chain Link Fence Fabric Curved Galvanized Steel Clips (for fastening chain link fence fabric to inner supports, top and bottom framing members of sliding gates only): 38 mm long x 13 mm wide x 4.5 mm thick curved galvanized steel clips. See architectural drawings for further details.

.10 Concertina: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

.11 Barbed wire: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

.12 Fittings and hardware for chain link fence and concertina installation: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

.13 Galvanized steel arms with integral post top combination: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

.14 Custom galvanized steel arms: for mid-point support of concertina above gate clear opening of south sallyport chain link panel gate. Design to suit. Submit shop drawing for approval.

.15 Galvanizing 2 Part Touch-up Paint: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.

2.2 CONTROLS

.1 Supervised Application – Constant Pressure:

.1 Vehicle Sallyport Gate(s): Constant pressure on the pushbutton control, with the gate in site, is required as a primary entrapment protection device to keep the gate in motion. When the pushbutton is released, the gate will stop. The secondary entrapment device shall be the inherent audio alarm. An auto-close timer shall not be used with constant pressure push button controls.

.1 Automated gates will need to be set up for maintained contact. Operator in guardhouse with need to hold contact during the complete open and closed cycle for the gate to move continuously from fully closed to fully open and again from fully open to fully closed (secure). If the operator removes this contact from the touch screen during gate movement, the gate will stop in place and not re initiate movement until the contact to the touch screen is restored. Operator should be in full view of the gate while the contact is maintained on the touch screen and the gate is in motion.

2.3 FINISH

.1 Galvanizing:

.1 All exposed system parts shall be zinc galvanized or as otherwise specified, to include color coating.

Part 3 Execution

3.1 SITE INSPECTION

.1 Coordinate with other trades for conduit placement prior to pouring of foundation concrete or paving.

.2 Final grades and installation conditions shall be examined. Installation shall not begin until all unsatisfactory conditions are corrected.

3.2 INSTALLATION

.1 Equipment in this section shall be installed in strict accordance with the company's printed instructions unless otherwise shown on the contract drawings.

3.3 SOUTH SALLYPORT INTERIOR GATE

.1 The existing fence around the South sally port interior gate is to be modified to suit a new wider gate. Modifications to the existing fence are to match existing and to requirements of Section 32 31 13 – Chain Link Fences and Swing Gates. Patch and make good after the new gate has been installed. The exact location of the new wider gate is to be approved by the Departmental Representative. Refer to the drawings for further information on new gate requirements.

.2 Secure chain link fence fabric to pipe gate framing with curved galvanized steel clips at 200 o/c max. Weld clips on chain link side of fence. Touch-up welds with galvanizing 2 part touch-up paint as specified.

.3 Installation of Barbed Wire And Concertina:

.1 Install overhang tops and caps on sliding gate posts as indicated.

.2 Install barbed wire and concertina as indicated on the Drawings, reviewed shop drawings and as directed by the Departmental Representative in accordance with CSC standards and Section 32 31 13 – Chain Link Fences and Swing Gates.

.3 Install custom galvanized steel arms as per approved shop drawings.

3.4 TOUCH UP

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply zinc touch-up primer and finish coat.

.1 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.5 FIELD QUALITY CONTROL

.1 Preliminary System Test:

.1 Preparation: Adjust the complete system and then operate it long enough to assure that it is performing properly.

.2 Run a preliminary test for each system:

.1 Determine whether the system is in a suitable condition to conduct the acceptance test.

.2 Check and adjust equipment.

.3 Train facility personnel.

.2 System Acceptance Test:

.1 Preparation: Notify the Owner's Representative at least three working days prior to the test so arrangements can be made to have a Facility Representative witness the test.

.2 Test each system function step by step.

.3 Supply all equipment necessary for system adjustment and testing.

.4 Test and Explain Safety Features:

.1 Each system feature and device is a separate component of the gate system.

.2 Ensure that all instructions for mechanical components, safety devices and the gate operator are available for everyone who will be using the gate system.

.3 The warning signs shipped with the gate operator must be installed in prominent position on both sides of the gate.

.5 Ensure the owner is clear with regard to the safety points concerning the basic operational guidelines of the safety features of the gate operator system. These safety points are listed in the operator manual and must be read prior to system use.

.6 Installer shall conduct an equipment training course for facility maintenance staff.

.7 Submit written report of test results signed by the installer and the Owner's representative.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A90/A90M-01, Standard Test Method for Weight of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.3 ASTM A121-07, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.4 A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM A123/A123M-09, Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.

.2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.

.3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.

.4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.

.3 CSA International

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

.2 CAN/CSA-A3000-08, Cementitious Materials Compendium.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete mixes, fences, posts and swing gates and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect fence and gate materials from damage.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of padding, crates, packaging materials and pallets in accordance with Section 01 74 21-Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: refer to structural drawing notes.

.2 Chain-link fence fabric:

.1 To CAN/CGSB-138.1: galvanized steel:

.1 Wire size: 4.8 mm minimum (6 gauge).

.2 Size of mesh: 50.8 mm.

.3 Height of fence fabric: as indicated.

.4 Barbed edges: top and bottom.

.5 Average mass of zinc coating: not less than 610 g/sq. m. of uncoated wire.

.6 Breaking tensile strength: 10,000 N minimum.

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe:

.1 Post spacing: 2.5 meters maximum.

.2 Line post minimum size: 73 mm O.D., 8.6 kg/m.

.3 Strain post minimum size: 114.3 mm O.D., 15.92 kg/m.

.1 Strain posts spacing: 60 metres maximum.

.4 Corner and gate post minimum size: 143.3 mm O.D., 21.0 kg/m.

.5 Bottom and top rail minimum size: 42.2 mm O.D., 3.4 kg/m.

.4 Tie wire fasteners: galvanized steel wire, 3.7 mm diameter (9 gauge) galvanized steel wire, to secure chain link fabric to bottom rail, top rail and line posts at 300 mm spacing.

.5 Tension bar: to ASTM A653/A653M, galvanized steel, used for holding the ends of the fence fabric at strain posts, corner and gate posts, to be 5 mm x 20 mm x full height of fence fabric.

.6 Swing Gates: to CAN/CGSB-138.4 unless noted otherwise.

.7 Swing Gate frames: to ASTM A53/A53M, galvanized steel pipe, 73 mm O.D. pipe weighing 8.6 kg/m, welded and drained.

.1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.

.2 Fasten fence fabric to gate with twisted selvage at top.

.3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

.4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position unless indicated otherwise.

.8 Fittings and hardware: to CAN/CGSB-138.2.

.1 Tension bar bands: 3 mm x 20 mm minimum, galvanized steel, spaced vertically at 300 mm o.c.

.2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.

.3 Overhang tops to provide waterproof fit, to hold top rails and a galvanized steel arm projecting inward to hold barbed wire overhang.

.4 Include galvanized steel arm with recesses to hold 2 strands of barbed wire spaced as follows:

.1 First recess to be located at a maximum distance of 125 mm from the base of the galvanized steel arm.

.2 Second recess to be located sufficiently away from the first recess so as to allow the barbed tape concertina to be installed at a diameter of 630 mm and as indicated.

.3 Length of galvanized steel arm: to suit.

.4 Galvanized steel arm projection angle: 45 degrees above horizontal.

.9 Barbed wire: for concertina coil support at fence top, two barbed wires stretched and fixed to galvanized steel arms as indicated, to consist of two strands of 2 mm (12 gauge) diameter galvanized steel wire with 4 point barbs at 130 mm spacing, to ASTM A121.

.10 Barbed Tape Concertina (B.T.C.): 20 x 0.5 mm galvanized tape clenched around a 2.5 mm diameter spring steel galvanized core wire to form a concertina coil with a nominal exterior coil diameter of 710 mm. The coil, when installed, shall have a minimum diameter of 635 mm. The barbed concertina shall have a 20 mm long blade type barbs measured from tip to tip of the blade, and barb clusters shall be spaced approximately 45 mm on centre. The concertina shall be formed by clipping adjacent loops of single helical coils together at a minimum of three (3) points on the circumference. Clips shall be galvanized. The resulting coil, when stretched, shall form a cylindrical pattern. The loop spacing shall not exceed 230 mm.

.11 Galvanizing Touch-up Paint: Make good corrosive protection after welding where burnt by welding operations and where removed to facilitate welding operations, using zinc touch-up primer conforming to CAN/CGSB-1.181-99 and finish coat. Use as per manufacturer's instructions.

.1 Acceptable products:

.1 Primer Coat: Sprayon S00740 or equal.

.2 Finish Coat: Krylon Industrial Silver Zinc or equal.

2.2 FINISHES

.1 Galvanizing:

.1 For chain link fabric: as indicated above.

.2 For pipe: 550g/m2 minimum to ASTM A90.

.3 For barbed wire: to CAN/CGSB-138.2.

.4 For other fittings: to ASTM A123/A123M.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for fence and gate installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 PREPARATION

.1 Grading:

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

.1 Provide clearance between bottom of fence and ground surface of 50 mm unless indicated otherwise.

3.3 ERECTION OF FENCE

.1 Erect fence along lines as indicated and to CAN/CGSB-138.3.

.2 Install line, straining and corner posts plumb, set in concrete footings as follows:

.1 Line posts, straining, swing gate, corner & end posts:

.1 Concrete depth: 2000 mm

.2 Diameter: as indicated in drawings.

.2 Ensure top of concrete piles are concave sloping away from the fence post to the outer edges of the pile.

.3 Ensure top edge of concrete pile is minimum 25mm above adjacent asphalt surface.

.3 Place concrete in post holes then embed posts into concrete to depths specified. Where bedrock is encountered within embedment length, extend 600mm into bedrock and grout solid with non-shrink grout. Extend concrete 50 mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set. Ensure posts are centred in post holes.

.4 Space line posts as indicated, measured parallel to ground surface.

.5 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.

.6 Install corner post where change in alignment exceeds 10 degrees.

.7 Install end posts at end of fence and at buildings.

.1 Install gate posts on both sides of gate openings.

.8 Place concrete in post holes then embed posts into concrete to depths specified.

.1 Extend concrete 50 mm above ground level and slope to drain away from posts.

.2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.9 Install fence fabric after concrete has cured, minimum of 5days.

.10 Install overhang tops and caps.

.11 Install top and bottom rail between posts. Secure top rail to posts through post top holes and bottom rail to post sleeves. Ensure expansion and contraction is provided for top and bottom rails. Secure waterproof caps and overhang tops.

.12 Lay out fence fabric to inmate side of posts. Stretch tightly and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Ensure distance between tension bar and posts does not exceed 13 mm.

.1 Fence fabric shall be pulled taut before fixing in place. Tautness, when fixed in place, is to be established by pull tests. The application of a 12 kg perpendicular pull at the midpoint of the mesh panel (midpoint of posts/rails) shall show a displacement of no more than 30 mm from the fence at rest plane.

.13 Secure fabric to top rails, line posts and bottom rail with tie wires:

.1 Give tie wires three complete rotation twists at back (non-inmate side) of posts and bend into post.

.14 Install barbed wire strands as indicated.

.15 The barbed tape concertina is to be supported and tied at 230 mm spacing onto each of the barbed wire strands.

3.4 INSTALLATION OF GATES

.1 Install gates in locations as indicated.

.2 Level ground between gate posts and set gate bottom as indicated above ground surface.

.3 Determine position of centre gate rest for double gate.

.1 Cast gate rest in concrete as indicated.

.2 Dome concrete above ground level to shed water.

.4 Install gate stops where indicated.

3.5 TOUCH UP

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply galvanizing touch-up paint as specified.

.1 Pre-treat damaged surfaces according to manufacturers' instructions.

3.6 CLEANING

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

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

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

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

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

1.2 DEFINITIONS

.1 Compost:

.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.

.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.

.3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminates.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality control submittals:

.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

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

1.4 QUALITY ASSURANCE

.1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 32 16.07- Construction Progress Schedules - Bar (GANTT) Chart.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 TOPSOIL

.1 Topsoil for turf: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

- .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 2 to 10% organic matter by weight.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Finished surface free from:
  - .1 Debris and stones over 50 mm diameter.
  - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
- .4 Consistence: friable when moist.

Part 3 Execution

3.1 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.

- .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.

- .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
- .2 Remove debris which protrudes more than 75 mm above surface.
- .3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.

- .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 For sodded areas keep topsoil 15 mm below finished grade.

.4 Spread topsoil to following minimum depths after settlement.

- .1 135mm for sodded areas.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.

.1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.4 ACCEPTANCE

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.5 SURPLUS MATERIAL

.1 Dispose of materials except topsoil not required off site.

3.6 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule sod laying to coincide with preparation of soil surface.

.2 Schedule sod installation when frost is not present in ground.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19- Project Meetings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements.

.3 Samples.

.1 Submit:

.1 Sod for each type specified.

.1 Install approved samples in1 square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.

.2 Bio-degradable geotextile fabric.

.3 0.5kg container of each type of fertilizer used.

.2 Obtain approval of samples by Departmental Representative.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Landscape Contractor: to be a Member in Good Standing of the Saskatchewan Turfgrass Association.

.2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.

.3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse by manufacturer and return of pallets, padding, crates, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.

.1 Turf Grass Nursery Sod types:

.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.

.2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.

.3 Number One Named Cultivars: Nursery Sod grown from certified seed.

.2 Turf Grass Nursery Sod quality:

.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.

.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.

.3 Mowing height limit: 35 to 65 mm.

.4 Soil portion of sod: 6 to 15 mm in thickness.

.2 Sod establishment support:

.1 Geotextile fabric: biodegradable.

.2 Wooden pegs: 17 x 8 x 200 mm.

.3 Biodegradable starch pegs: 17 x 8 x 200 mm.

.3 Fertilizer:

.1 To Canada "Fertilizers Act" and Fertilizers Regulations.

.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

.1 Obtain written approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

Part 3 Execution

3.1 INSTALLERS

.1 Use installers who are Member in Good Standing of the Saskatchewan Turfgrass Association.

3.2 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.3 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13- Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.

.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, to contours, to tolerance of plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site, in accordance with Section 01 74 21- Construction/Demolition Waste Management And Disposal.

3.4 SOD PLACEMENT

.1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

.2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.

.3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.4 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.5 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.

.2 Start laying sod at bottom of slopes.

.3 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:

.1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.

.2 Not less than 3-6 pegs per square metre.

.3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.

.4 Drive pegs to 20 mm above soil surface of sod sections.

3.6 FERTILIZING PROGRAM

.1 Fertilize during establishment and warranty periods as directed by Departmental Representative:

3.7 CLEANING

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

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

.2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

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

.1 Clean and reinstate areas affected by Work.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

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

.2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.8 PROTECTION BARRIERS

.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by Departmental Representative.

.2 Remove protection 2 weeks after installation and after inspection by Departmental Representative.

3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.

.1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

.2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.

.3 Maintain sodded areas weed free 95%.

.4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.10 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:

.1 Sodded areas are properly established.

.2 Sod is free of bare and dead spots.

.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.

.4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

.3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

.4 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.11 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:

.1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

.2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.

.3 Cut grass and remove clippings that will smother grass as directed by Departmental Representative to height as follows:

.1 Turf Grass Nursery Sod:

.1 50 mm during normal growing conditions.

.2 Cut grass at 2 week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.

.3 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.4 Eliminate weeds by mechanical means to extent acceptable to Departmental Representative.

END OF SECTION