Stantec

Publics Works and Government Services Canada (PWGSC)

Schefferville Airport
Replacement of Visual Aids

Client Ref.: R.096390.001

TECHNICAL SPECIFICATIONS

Electrical

SR4 ISSUED - For Tender

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Prepared for:
PWGSC

Prepared by:
Stantec

September 11, 2019

O/Ref.: 157102418-400-EL-S-0002-00

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TECHNICAL SPECIFICATIONS
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Prepared by:

Electrical

Prepared by:

Airport Engineering

SR4 Issued - For Tender (2019-09-11)
"This document shall not be used for Construction"

Stantec

PROJECT NO.: 157102418-400-EL-S-0002-00

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DIVISION 01

General Requirements

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Sections of Division 01 - General Requirements.

.2 Sections of Division 26 - Electrical.

.3 Sections of Division 33 - Utilities.

.4 Sections of Division 34 - Transportation.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises replacement of visual aids and other works as indicated, located at Schefferville airport. Not limited to, works include:

- .1 Replacement of the following items of equipment:
  - .1 Runway edge lighting;
  - .2 Threshold runway lighting;
  - .3 Taxiway “Alpha” lighting;
  - .4 Apron lighting;
  - .5 Wind cones for runway thresholds 17 and 35;
  - .6 PAPIs for runway thresholds 17 and 35;
  - .7 REILs for runway thresholds 17 and 35;
  - .8 Mandatory instruction signs;
  - .9 Current regulator at FEC and addition of a spare regulator;
  - .10 Heating system for PAPIs;
  - .11 ARCAL receptor;
  - .12 Rotating beacon control.
- .2 Addition of the following equipment:
  - .1 Indicator signs;
  - .2 Dedicated electrical panel for all airfield lighting;
  - .3 Obstruction lighting;
  - .4 Remote monitoring of emergency generator in the garage;
  - .5 Two force flow heaters to serve as resistive loads;
  - .6 Unfused safety switches.
- .3 Relocation of the following equipment:
  - .1 Camera system and RF communication.
- .4 Conduit network construction;
- .5 Excavation, backfill, and finishing of surfaces;
- .6 Electrical cabling;
- .7 New hold line marking and removal of existing marking;

.8 Cold mix paving for electrical trenches.

.9 Temporary works required for proper execution including:

.1 Relocation of existing equipment from FEC to the electrical room in order to free up space for new equipment;

.2 Required temporary wiring to maintain service continuity;

.3 Retaining or dismantling and reinstalling existing elements conflicting with excavation works including electrical poles, fences, and protection bollards.

.10 Demolition works, including removal of equipment and associated wiring up to feed point;

.11 Grounding of all installed systems;

.12 Commissioning of all equipment;

.13 Training of operation and maintenance personnel on site;

.14 Supply of spare materials;

.15 All other work shown on drawings or as noted in specifications.

.2 The supply, transportation, and installation of a container to store materials on-site to avoid shipping delays for 2020 installation.

.3 Works include temporary measures required on site to provide complete project, including temporary fences and construction barriers, as well as vehicle and pedestrian accesses.

1.3 WORK SEQUENCE

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

.2 Co-ordinate Progress Schedule with Departmental Representative.

.3 Required stages:

.1 Before February 15, 2020:

.1 Purchase, transportation, and storage in on-site container of all equipment and materials required for work execution. Supply required container with side mounted doors. Refer to Section 01 21 00 - Allowances for payment conditions for the supply of equipment and materials.

.2 Between March 31, 2020 and August 31, 2020:

.1 Equipment replacement on runways and inside terminal.

.2 Replacement of cabling including trenching, conduits, cables, grounding, etc.

.3 Commissioning.

.4 All other Work on drawings and in specifications.

1.4 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work to allow:

.1 Departmental Representative's occupancy.

.2 Work by other contractors.

.3 Public usage.

.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 Ensure that operations conditions of existing work at completion are still the same, equal to or better than that which existed before new work started.

.7 Maintain fire access and provide means to combat fire.

1.5 DEPARTMENTAL REPRESENTATIVE'S OCCUPANCY

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

.2 Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate his usage.

1.6 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.

.2 Use only existing access points and circulations in building for moving workers and material.

.1 Accept liability for damage, safety of equipment and overloading of existing equipment.

1.7 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 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 vehicular traffic and site operations.

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

.4 Submit schedule for approval by Departmental Representative for any shutdown 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 services.

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

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

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

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

.10 Construct barriers, as required, in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.8 DOCUMENTS REQUIRED

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

.1 Contract Drawings;
.2 Specifications;
.3 Addenda;
.4 Reviewed Shop Drawings;
.5 List of Outstanding Shop Drawings;
.6 Change Orders;
.7 Other Modifications to 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 RELATED REQUIREMENTS

.1 01 35 13.13 - Special Project Procedures for Airport Facilities.

1.2 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

.2 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, and other authorized expenses incurred in performing Work.

.3 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.6 Include progress payments on accounts of work authorized under cash allowances in Departmental Representative’s monthly certificate for payment.

.7 Amount of each allowance, for each work specified in each respective specification Section as follows:

.1 Section 01 35 13.13 - Special Project Procedures for Airport Facilities, include allowance of $ $25,000 for escort services / gatekeeper.

.1 Hourly rate for these services is $40.00 an hour including personnel, vehicle, and necessary communication equipment.

.2 Contractor to record expenses for this allowance et obtain daily written approval from Departmental Representative.

.2 Include a $400,000 allowance for supply and transportation of project equipment and materials to the Schefferville airport storage site before February 15, 2020, in accordance with Section 01 11 01 - General Information Related to Work.

.1 This fixed allowance covers the period between Contract award and equipment and material supply and transportation to the Schefferville airport storage site; this will be the only payment made for this period.

.2 This allowance includes, for this period, overhead costs, mobilization and organization costs, and supply and transportation to Schefferville airport’s storage site of all equipment and materials.

.3 Mobilization includes preparation, transportation, and unloading of equipment and materials. Organization includes job site installations, worker transportation costs and worker accommodations if required.

.4 For the purpose of payment, 100% of this allowance will be paid upon delivery of equipment, in a container, to Schefferville airport's storage site.

.5 Other Contractor expenses for complete work execution not specifically covered by this fixed allowance must be included in the Contractor's general costs and split among other payment items.

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 PRECONSTRUCTION MEETING

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

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

.3 Departmental Representative will establish time and location of meeting and notify parties concerned minimum five (5) days before meeting.

.4 Departmental Representative will record minutes of meetings and circulate to attending parties and affected parties not in attendance within three (3) days after meeting. Agenda to include:

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

.2 Schedule of Work, Construction Progress Schedules.

.3 Review of the particular conditions of section 01 35 13.13 – Special Procedures for Airport Facilities.

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

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

.6 Delivery schedule of materials.

.7 Site security.

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

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

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

.11 Appointment of inspection and testing agencies or firms.

.12 Insurances, transcript of policies.

1.2 PROGRESS MEETINGS

.1 Departmental Representative will establish a calendar for periodic meetings during the work progress.

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

.3 Departmental Representative will notify parties minimum five (5) days prior to meetings.

.4 Departmental Representative will record minutes of meetings and circulate to attending parties and affected parties not in attendance within three (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 affect on construction schedule and on completion date;
.12 Other business.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 DEFINITIONS

.1 Activity: Distinct, scheduled portion of work performed during course of a project.

.2 Activity Duration: Time in calendar units between start and finish of a scheduled activity. See also Duration.

.3 Assumption: Factor in planning process that is considered true, real, or certain without proof or demonstration.

.4 Bar Chart (Gantt Chart): Graphic display of schedule-related information.

.1 In typical bar chart, schedule activities or Work Breakdown Structure components are listed down left side of chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars.

.5 Baseline: Approved version of a work product that can be changed only through formal change control Procedures and is used as a basis for comparison.

.6 Budget: Approved estimate for a project or Work Breakdown Structure component or schedule activity.

.7 Cash Flow: Projection of progress payment requests based on cash loaded construction schedule.

.8 Change Control: Process whereby modifications to documents, deliverables, or baselines associated with a project are identified, documented, approved, or rejected.

.9 Completion Milestones: They are firstly Interim Certificate.

.10 Constraint: Scheduled limiting factor that effects execution of a project, program, portfolio, or process.

.11 Contract: Mutually binding agreement that obligates a seller to provide a specified product or service or result and obligates a buyer to pay for it.

.12 Control: Comparing actual performance with planned performance, analyzing variance, assessing trends, to effect process improvements, evaluating possible alternatives, and recommending appropriate corrective action as needed.

.13 Corrective Action: Intentional activity that realigns performance of project work with Project Management Plan.

.14 Critical Path: Sequence of activities that represents longest path through a project, which determines shortest possible duration.

.15 Critical Path Activity: Activity on critical path in a project schedule.

.16 Critical Path Method (CPM): Method used to estimate minimum project duration and determine amount of scheduling flexibility on logical network of paths within schedule model.

.17 Data Date: Point in time when the status of the project is recorded.

.18 Decomposition: Technique used for dividing and subdividing project scope and project deliverables into smaller, more manageable parts.

.19 Deliverable: Unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project.

.20 Duration: Total number of work periods (not including holidays or other non-working periods) required to complete a schedule activity or Work Breakdown Structure component.

.1 Usually expressed as workdays or work weeks.

.21 Early Finish Date (EF): In Critical Path Method, earliest possible point in time when uncompleted portions of schedule activity can finish based on schedule network logic, data date, and schedule constraints.

.1 Early finish dates can change as Project progresses and changes are made to Project plan.

.22 Early Start Date (ES): In Critical Path Method, earliest possible point in time when uncompleted portions of a schedule activity can start based on schedule network logic, data date, and schedule constraints.

.1 Early start dates can change as Project progresses and changes are made to Project Plan.

.23 Execute: Directing, managing, performing, and accomplishing project work; providing deliverables and work performance information.

.24 Finish Date: Point in time associated with a schedule activity's completion.

.1 Usually qualified by one of following: Actual, planned, estimated, scheduled, early, late, baseline, target, or current.

.25 Float: (also known as slack) Amount of time a schedule activity can be delayed without delaying early start date of a successor or violating a schedule constraint.

.26 Forecast: Estimate or prediction of conditions and events in project future based on information and knowledge available at time of forecast.

.1 Information is based on projects past performance and expected future performance, and includes information that could impact project in future, a such as estimate at completion and estimate to complete.

.27 Gantt Chart: See Bar Chart.

.28 Impact Analysis: Schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.

.29 Imposed Date: A fixed date imposed on a schedule activity or schedule milestone, usually in form of a “start no earlier than” and “finish no later than” date.

.30 Lag: Amount of time whereby a successor activity is required to be delayed with respect to a predecessor activity.

.31 Late Finish Date (LF): In critical path method, latest possible point in time when uncompleted portions of a schedule activity can finish based on schedule network logic, project completion date, and schedule constraints.

.32 Late Start Date (LS): In critical path method, latest possible point in time when uncompleted portions of a schedule activity can start based on schedule network logic, project completion date, and schedule constraints.

.33 Lead: Amount of time whereby a successor activity can be advanced with respect to a predecessor activity.

.34 Logic Diagram: See Project network diagram.

.35 Logical Relationship: Dependency between two activities or between an activity and a milestone.

.36 Master Schedule: Summary-level schedule that identifies major deliverable; work breakdowns structure components, and key schedule milestones.

.37 Milestone: Significant point or event in a project, program, or portfolio.

.38 Monitor: Collect project performance data with respect to a plan, procedure performance measures, and report and disseminate performance.

.39 Network: See Project Schedule Network Diagram.

.40 Non-Critical Activities: Activities which when delayed, do not affect specified Contract duration.

.41 Project Control System: Fully computerized system utilizing commercially available software packages.

.42 Project Management: Application of knowledge, skills, tools, and techniques, to project activities to meet project requirements.

.43 Project Management Plan: Approved document that describes how project will be executed, monitored, and controlled.

.1 Primary uses of Project management plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.

.2 Project management plan may be summary or detailed.

.44 Project Management Planning: Development and maintenance of Project Management Plan.

.45 Project Management Planning, Monitoring and Control System: Overall system operated to enable monitoring of Project Work in relation to established milestones.

.46 Project Schedule: Planned dates for performing activities and planned dates for meeting milestones.

.47 Project Schedule Network Diagram: Graphical representation of logical relationships among project schedule activities.

.1 Always drawn from left to right to reflect Project chronology.

.48 Project Scope: Work performed to deliver a product, service, or result with specified features and functions.

.49 Quantified Days Duration: Working days based on 5-day work week, discounting statutory holidays.

.50 Risk: Uncertain event or condition that, if it occurs, has positive or negative effect on one or more project objectives.

.51 Schedule: See Project Schedule.

.52 Schedule Data: Collection of information for describing and controlling schedule.

.53 Scope: See Project Scope.

.54 Start Date: Point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.

.55 Work Breakdown Structure (WBS): Hierarchical decomposition of total scope of work to be carried out by project team to accomplish project objectives and create the required deliverables.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Project Meeting:

.1 Meet with Departmental Representative within 15 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.

.2 Participate in regular project progress meetings with Departmental Representative specifically intended to discuss update of detailed schedule and contract changes.

.2 Scheduling:

.1 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.

.2 Ensure project schedule efficiencies through monitoring of project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.

.3 Monitor sufficiently often so that causes of delays can immediately be identified and mitigated.

.3 Project Monitoring and Reporting:

.1 Keep team aware of changes to schedule, and potential consequences as project progresses.

.2 Use narrative reports to provide advice on seriousness of challenges and measures to overcome them.

.3 Begin narrative reporting with statement on general status of project followed by summarization of delays, potential problems, corrective measures and project status criticality.

.4 Critical Path Method (CPM) Requirements:

.1 Ensure Master Plan and Detail Schedule are practical and remain within specified contract duration.

.2 Revise Master Schedule and Detail Schedule deemed impractical by Departmental Representative and resubmit for approval.

.3 Change to Contract Duration:

.1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.

.2 Duration of Contract may only be changed through bilateral Agreement.

.4 Consider Master Schedule and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.

.5 First Milestone on Master Schedule and Detail Schedule will identify start Milestone with an Early Start, ES, constraint date equal to Award of Contract date.

.6 Calculate dates for completion of milestones from Plan and Schedule using specified time periods for Contract.

.7 Substantial Completion with Late Finish, LF, constraint equal to calculated date.

.8 Calculations on updates such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.

.9 Delays to non-critical activities with float may not be basis for time extension.

.10 Do not use float suppression techniques such as software constraints, preferential sequencing, extended activity times, imposed dates other than required by Contract, special lead/lag logic restraints.

.11 Allow for adverse weather conditions normally anticipated and show in Master Plan and Detail Schedule.

.1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.

.12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.

.1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.

.13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring.

.1 Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.

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

.2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring, and reporting of project progress.

.3 Submit Project Control System to Departmental Representative for approval.

.1 Failure to comply with each required submission, may result in progress payment being withheld in accordance with Federal Government's GC 5 Terms of Payment.

.4 Include costs for execution, preparation, and reproduction of schedule submittals in bid documents.

.5 Submit letter ensuring that schedule has been prepared in co-ordination with major sub-contractors.

.6 Refer to article PROGRESS MONITORING AND REPORTING of this Specification Section for frequency of Project control system submittals.

.7 Submit impact analysis of schedule for changes that result in extension of contract duration.

.1 Include draft schedule update and report as outlined in article PROGRESS MONITORING AND REPORTING.

.8 Submit Project planning, monitoring, and control system data as required by Departmental Representative in following form:

.1 Electronic files in original scheduling software Microsoft Project containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update;

.2 Master Schedule Bar Chart;

.3 Construction Detail Schedule Bar Chart;

.4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes, and float;

.5 Criticality report listing activities and milestones with total float used as first sort for ready identification of critical paths through entire project. List early and late starts and finishes dates, together with durations, codes, and float for critical activities;

.6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within two (2) months from monthly update date. List activity identification number, description and duration. Provide columns for

entry of actual start and finish dates, duration remaining, and remarks concerning action required.

1.4 QUALITY ASSURANCE

.1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

1.5 WORK BREAKDOWN STRUCTURE (WBS)

.1 Prepare construction Work Breakdown Structure (WBS) within 15 working days of Award of Contract date.

.1 Develop WBS through at least five (5) levels: Project, stage, element, sub-element, and work package.

1.6 PROJECT MILESTONES

.1 Mandatory and recommended project milestones form targets for both Master Schedule and Detail Schedule of CPM construction network system.

.2 Particular execution conditions for this project:

.1 Ensure that runway lighting is maintained throughout the duration of the work.

.2 Plan the work considering that the deactivation period for PAPI and RTIL 17 and 35 would be for a maximum of two (2) continuous weeks.

.3 Work in the air movement will be carried out during the air movement area closure periods so to allow for airport operations according to the following conditions:

.1 Monday to Sunday, between 8:00 pm and 8:00 am the next day, unless otherwise stated. Outside these periods of closure, the movement area of the airport will be open to air operations for both scheduled flights and general aviation.

.4 Excavations in airport areas must be backfilled and the backfill material compacted before each period of operation.

.5 An open trench of a maximum length of 60 meters is permitted at a time.

.6 Excavation work with a test board must begin on the north side of threshold 35.

1.7 MASTER SCHEDULE

.1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.

.2 Prepare comprehensive construction Master Schedule (CPM logic diagram) and dependent Cash Flow Projection to confirm validity or alternates of identified milestones.

.1 Master Schedule will be used as baseline.

.1 Revise baseline as conditions dictate and as required by Departmental Representative.

.2 Departmental Representative as Project progresses will review and return revised baseline within five (5) workdays.

.3 Reconcile revisions to Master Schedule and Cash Flow Projections with previous baseline to provide continuous audit trail.

.4 Initial and subsequent Master Schedule will include:

.1 USB Drive containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.

.2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status, and budget amounts.

.3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status, and durations.

.4 Actual/projected monthly cash flow: Expressed monthly and annually and shown in both graphical and numerical form.

1.8 DETAIL SCHEDULE

.1 Provide detailed project schedule (CPM logic diagram) within 15 working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:

.1 Shop drawings;

.2 Samples;

.3 Approvals;

.4 Procurement;

.5 Construction;

.6 Installation;

.7 Site works;

.8 Testing;

.9 Commissioning and acceptance.

.2 Detail CPM schedule to cover entire length of Project.

.1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.

.3 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Schedule.

.4 Clearly show sequence and interdependence of construction activities and indicate:

.1 Start and completion of all items of Work, their major components, and interim milestone completion dates.

.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

.1 Time for submittals, resubmittals and review.

.2 Time for fabrication and delivery of manufactured products for Work.

.3 Interdependence of procurement and construction activities.

.3 Include enough detail to assure adequate planning and execution of Work.

.5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.

.6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form Critical Path. Increased number of critical activities is seen as indication of increased risk.

.7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.

.8 Maintain updated version of project schedule in accordance with actual project execution conditions.

1.9 REVIEW OF CONSTRUCTION DETAIL SCHEDULE

.1 Allow minimum five (5) workdays for review by Departmental Representative of proposed construction Detail Schedule, unless otherwise specified.

.2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within maximum five (5) workdays, unless otherwise specified.

.3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.

.4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

1.10 COMPLIANCE WITH DETAIL SCHEDULE

.1 Comply with reviewed Detail Schedule.

.2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after receipt of approval by Departmental Representative.

.3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.

.1 Corrective measures may include:

.1 Increase of personnel with more experience/qualifications on site for effected activities or work package.

.2 Increase in equipment and materials.

.3 Overtime work and additional work shifts.

.4 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. As part of supporting evidence, include:

.1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved Contract schedule.

.2 Prepared schedule indicating how change will be incorporated into overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.

.3 Other supporting evidence requested by Departmental Representative.

.4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.

.5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.

.1 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.

.2 Construction delays affecting project schedule will not constitute justification for extension of Contract completion date.

1.11 PROGRESS AND REPORTING

.1 On an ongoing basis, Detail Schedule on job site to show “Progress to Date”. Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.

.3 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Submit to Departmental Representative copies of updated Detail Schedule.

.6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate potential delay. Include in report:

.1 Description of progress made.

.2 Pending items and status of: Shop drawings, permits, possible time extensions and change orders.

.3 Status of Contract completion date and milestones.

.4 Current and anticipated problem areas, potential delays, and corrective measures.

.5 Review of progress and status of Critical Path activities.

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 Canada.

.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 tendays 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, in duplicate, containing:

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

.8 Submissions include:

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

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

.10 Submit three (3) printed copies and one (1) electronic copy of shop drawings for each requirement requested in Specifications and as Departmental Representative may reasonably request.

.11 Submit electronic three (3) printed copies and one (1) electronic copy of product data sheets or brochures for requirements requested in specifications and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit three (3) printed copies and one (1) electronic copy of test reports for requirements requested in Specifications 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 three (3) years of date of Contract award for project.

.13 Submit three (3) printed copies and one (1) electronic copy of certificates for requirements requested in Specifications 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 three (3) printed copies and one (1) electronic copy of manufacturers instructions for requirements requested in Specifications and as requested by Departmental Representative.

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

.15 Submit three (3) printed copies and one (1) electronic copy of Manufacturer's Field Reports for requirements requested in Specificationw and as requested by Departmental Representative.

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

.16 Submit three (3) printed copies and one (1) electronic copy of Operation and Maintenance Data for requirements requested in Specifications and as requested by Departmental Representative.

.17 Delete information not applicable to project.

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

.19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies transparency 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.

.20 The review of shop drawings by the Departmental Representative 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 triplicate as requested in respective specification Sections. Label samples with origin and intended use.

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

.3 Notify Consultant 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, high resolution, weekly with progress statement as directed by Departmental Representative.

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

.3 Number of viewpoints: Minimum five (5) locations. However, the number is related to the state and complexity of completed works. Departmental Representative will determine with the Contractor the number of desired viewpoints.

.4 Frequency of Photographic Documentation: Daily or as directed by Departmental Representative.

.1 Upon completion of framing and services before concealment, of Work, excavation, foundation, as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

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

.2 Submit transcription of insurance immediately after award of 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 DEFINITIONS

.1 Restricted Area: Any area within an airport enclosure that is marked as prohibited by a sign or is otherwise controlled by any sign is a restricted area.

.2 Aircraft Movement Area: The portion of an airport used for the movement of aircraft, including maneuvering areas (runway and taxiway) and apron areas.

1.2 RESPONSIBILITIES OF THE GENERAL CONTRACTOR

.1 Read the airport and airport safety regulations "Airport Traffic Regulations" and the Construction Exploitation Plan (CEP) specific to this Project so to inform employees and subcontractors.

.2 The Departmental Representative will provide a copy of the CEP approved by the appropriate authorities.

.3 The regulations can be found at: https://www.tc.gc.ca/eng/acts-regulations/menu.htm under "Government Land Traffic Act".

.4 Be responsible for personnel, construction vehicles, and subcontractors involved in the Project and required to enter restricted areas.

.5 Provide the Departmental Representative with a list of responsible personnel, including an escort officer, who, in case of emergency, can be reached after working hours.

.6 Designate, among employees, a responsible person who will maintain constant with the airport escort.

.7 Ensure that runway lighting is maintained throughout the duration of the work.

.8 Plan the work considering that the deactivation period for PAPI and RTIL 17 and 35 would be for a maximum of two (2) continuous weeks.

1.3 MEASUREMENT FOR PAYMENT

.1 The Contractor will pay the direct costs and expenses associated with escort services. These services are subject to a monetary allowance included in the Contract Price and will be reimbursed as described in Section 01 21 00 - Allowances.

.2 In addition to the airport escort services, all other expenses incurred in the compliance of the requirements of this section must be included in the Contractor's overhead costs and/or allocated proportionately in the various payment items of the bid.

1.4 AIRPORT ESCORTS

.1 Airport escort services may be provided by the airport operator or an accredited firm.

.1 Airport escorts are required when airport facilities are in operation and movement of the Contractor’s staff on the airfield must be coordinated. The

remaining of the time the staff will be posted at the access barrier so to control access to the airfield.

.2 This staff when acting as guard at the gate, should be in constant contact with the team leader directing work on the airfield as well as with the flight information station.

.2 When the airport is not in service, any vehicles or persons who enter a restricted area must report to the gatekeeper and provide identification. Any person or equipment not authorized by the airport operator, the Contractor, and Departmental Representative will be denied access to the airfield side of the facilities.

.3 When the airport is in service, any vehicle or person that must enter a restricted area must be accompanied by an escort and each vehicle must be equipped with an amber rotating beacon. The access barrier to the airfield side of the installations should always be closed, except for passages authorized by the airport operator, the Departmental Representative, and the Contractor.

.4 Access to the site by Contractor's vehicles and equipment will be limited to the secure entry points. These access points always require a security staff during the periods of work and will be provided by the Contractor.

.5 No vehicles or other modes of transportation related to the work will use or travel on the paved surfaces (runway, taxiway, and apron) located outside the limits of the designated work sites without an authorized security service escort.

.6 The Contractor and his employees must immediately comply with escort instructions.

.7 The Contractor shall notify the airport operator at least 12 hours in advance of any changes to the schedule or work program previously approved by the Departmental Representative when escorts are required. This requirement is necessary to plan the work schedules of the staff assigned to escort services.

.8 The Contractor must have written approval of the Departmental Representative, on a daily basis, for the registration of time allocated for work tasks.

1.5 WORK TIMETABLE

.1 The Contractor must note and consider that the work in the air movement will be carried out during the air movement area closure periods so to allow for airport operations according to the following conditions:

.1 Monday to Sunday, between 8:00 pm and 8:00 am the next day, unless otherwise stated. Outside these periods of closure, the movement area of the airport will be open to air operations for both scheduled flights and general aviation.

.2 Runway closures may vary depending on airline delays and weather conditions. The flight schedule for Schefferville is updated on the Air Inuit website: https://www.airinuit.com/en/flight-schedule.

.3 The period of closure of the movement area may, however, be carried over, delayed, or modified over time, so to take in account contingencies related to air traffic.

.4 The contractor shall validate daily the flight schedule with the Departmental Representative as the operation periods of the airport may vary.

.5 The Contractor must take note and consider that the work will be carried out outside the periods of operation described above.

.6 In preparation for a period of operation, the Contractor shall remove its material, equipment, and personnel to a minimum distance of 90 m measured from the edge of the runway.

.7 During periods of operation, no stockpiled material will be permitted within the leveled area. The trenches must have been backfilled and the backfill material compacted before each period of operation.

.8 Perform work in stages and progress in the manner provided in the Contract to allow the day-to-day operations of the airport schedule.

.9 In emergency situations and in the case of medical evacuations, periods of closure of the movement area of the airport may be cancelled, delayed, or shortened. When emergencies occur during the closure period, the movement area of the airport should be open to air operations as soon as possible as described in article 1.10 below. A two-hour notice is normally given for medical evacuations. The track must be fully usable in this period of time. The average number of medical evacuations is three (3) per week.

1.6 MAINTAINING AIR TRAFFIC CIRCULATION

.1 No work will be permitted on the airport movement area during periods of airport operation.

.2 When excavations are made, they must be barricaded as required by provincial law. Any trench must be sufficiently marked, flagged, and barricaded to provide adequate protection for the public.

.3 Excavations in airport areas must be backfilled before the end of each working day.

.4 At the end of each shift, during emergency situations and prior to the opening of the airport movement area, the Contractor must inevitably comply with the procedure and following requirements:

.1 The Contractor must inspect the airport movement area with the Departmental Representative and promptly proceed with any corrective work required by the latter.

.2 During periods of operation of the airport movement area, the Contractor shall move and store equipment and materials at the site designated by the Departmental Representative.

1.7 SECURITY MEASURES

.1 Do not interfere with airport operations without the authorization of the Departmental Representative.

.2 Take any necessary temporary security measures for the transportation of the public, personnel, pedestrians, equipment, and vehicular traffic.

.3 Place barriers where indicated by Departmental Representative.

.4 Parking of equipment and storage of materials will only be permitted in the area designated by the Departmental Representative.

1.8 MOVEMENT OF EQUIPMENT AND PERSONNEL

.1 If Work is performed in areas of the airport open to air traffic:

.1 Submit the Work Schedule to the Departmental Representative for approval.

.2 Control movement of equipment and personnel in accordance with the Departmental Representative's instructions.

.3 The Contractor and the Contractor’s employees shall comply immediately with the Departmental Representative’s instructions.

.4 Radios are required for communications between the Contractor, the escort, the Departmental Representative, and Transport Canada Representative will be provided by the Contractor.

.5 At the end of each shift, all equipment and materials shall be moved to a location within the airport enclosure following approval by the Departmental Representative in cooperation with the airport’s operational personnel.

1.9 UNSERVICEABLE AREAS

.1 Mark off areas made unserviceable for aircraft by Work of this Contract by providing highly visible danger.

.2 Open flames and flammable fuels are not permitted.

.3 Park equipment not in use and stockpile materials so that stockpile tops are below 50 to 1 ratio from ends of useable landing strip and below 20 to 1 ratio from sides of aircraft traffic areas.

1.10 DAILY SECURITY

.1 No work with an open flame, nor fire and smoking on the deck is permitted, and any contravening of airport regulation regarding this is under the penalty of a fine. This is due to the omnipresence of fuel lines and vapors.

.2 Ensure at the end of each workday that the barrier is locked and there are no breaches in the airport’s perimeter fence.

.3 The Contractor must provide security for access to the airport enclosure for the entire period of the execution of Work.

.4 It is forbidden to eat on airport maneuvering areas.

1.11 TRENCHING

.1 Obtain the written permission of the Departmental Representative before proceeding with trenching work.

.2 Excavations in airport areas must be backfilled and the backfill material compacted before each period of operation.

.3 An open trench of a maximum length of 60 m is permitted at a time.

.4 Excavation work with a test board must begin on the north side of threshold 35.

1.12 PUBLIC SERVICE NETWORKS AT THE AIRPORT

.1 The Departmental Representative will stake or indicate the approximate location of the airport's underground utilities (cables, pipes, conduits, etc.).

.2 The Contractor will have to identify the exact location of underground service networks using an exploratory search carried out by hand if necessary.

.3 Notify the Departmental Representative at least 48 hours in advance of the location of the Work to be done, so to allow time to locate underground utilities.

1.13 DAILY SPECIAL PROCEDURES FOR THE COORDINATION OF WORK

.1 Verification of Daily Flight Schedules:

.1 The Contractor shall coordinate with the Airport Manager for confirmation of flight times (arrival and departure) at Schefferville Airport.

.2 Working hours on the runway and taxiway will be adjusted if there are any variations from the normal period stated in the specifications for the performance of the Work.

.2 Opening of the Track:

.1 Following the completion of the work, a work inspection will be carried out by the Departmental Representative and the Airport Manager or his representative for the verification of the quality of the works and the compliance of temporary measures after each day.

.2 Any required corrections must be made immediately by the Contractor.

.3 As soon as the compliance of the work is validated by the committee, an official notice of opening of the track will be issued by the Airport Manager.

.3 Arrangement of Equipment:

.1 The Contractor must obtain the authorizations required by the competent authorities (Land Holding) to develop safe, including the guarding of its equipment storage site and materials.

.4 Daily Work Program:

.1 The Contractor shall submit daily for approval the detailed work program.

Part 2 Products

2.1 NOT APPLICABLE

.1 Not applicable.

Part 3 EXECUTION

3.1 NOT APPLICABLE

.1 Not applicable.

END OF SECTION

Part 1 General

GENERAL NOTE: In this Section, the term "site" includes all the facilities located at the site where the Work is taking place (construction site, buildings, access, infrastructure, parkings, bays, etc.).

1.1 REFERENCES

.1 Province of Québec.

.1 Loi sur la santé et la sécurité du travail L.R.Q., c. S-2.1 (Act respecting Occupational Health and Safety).

.2 Code de sécurité pour les travaux de construction L.R.Q., c. S-2.1, r.4 (Safety Code for the Construction Industry).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative, and the CNESST the site-specific prevention program, as outlined in the article "GENERAL REQUIREMENTS", at least 10 days prior to the start of Work.

.3 Departmental Representative will review Contractor's site-specific prevention program and provide comments to Contractor within TEN (10) days after receipt of the document. Revise plan as appropriate and resubmit to Departmental Representative within five (5) days after receipt of comments from Departmental Representative. Departmental Representative reserves the right not to authorize the start of work on the construction site as long as the content of the prevention program is not satisfactory. The Contactor must then update his prevention program and resubmit it to the Departmental Representative if the scope of work changes or if the working methods of the Contractor differ from his initial plans or for any other applicable new condition.

.4 Departmental Representative's review of Contractor's site-specific prevention program should not be construed as approval of the program and does not reduce the Contractor's overall responsibility for Construction Health and Safety during the Work.

.5 Submit copies of Contractor's authorized representative's construction site health and safety inspection reports to Departmental Representative, at least once a week.

.6 Submit to Departmental Representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by Federal or Provincial health and safety inspectors.

.7 Submit to Departmental Representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard. The investigation report must contain at least the following:

.1 Date, time, and place of accident;

.2 Name of sub-contractor involved in the accident;

.3 Number of persons involved and condition of wounded;

.4 Witness identification;

.5 Detailed description of tasks performed at the time of the accident;

.6 Equipment being used to accomplish the tasks performed at the time of the accident;

.7 Corrective measures taken immediately after the accident;

.8 Causes of the accident;

.9 Preventive measures that have been put in place to prevent a similar accident.

.8 Submit to Departmental Representative, WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittals. Contractor must also keep one (1) copy of these documents on the construction site.

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

.10 Submit to Departmental Representative an on-site Emergency Response Plan simultaneously with the prevention program. The Emergency Response plan must contain the elements listed in the article "GENERAL REQUIREMENTS" of this Section.

.11 Submit to Departmental Representative copies of all training certificates required for the application of the prevention program, in particular (if applicable) for the following:

.1 First-aid in workplace and cardiopulmonary resuscitation;

.2 Work likely to release asbestos dust (mandatory for all work where asbestos is present);

.3 Work in confined spaces (mandatory for all work in confined spaces);

.4 Lockout-tagout procedures (mandatory for all work requiring lockout);

.5 Safely operating forklift trucks (mandatory for all forklift usage);

.6 Safely operating elevating work platforms (mandatory for the use of all elevating platforms);

.7 Any other requirement of Regulations or the Safety Program.

.12 In addition, the certifications of the *Cours de santé et sécurité générale pour les chantiers de construction* (General Health and Safety Training for Construction Sites) must be available on demand on the construction site.

.13 Engineer's drawings and certificates of compliance: Contractor must submit to the Departmental Representative and to the *Commission des normes, de l'équité, de la santé et de la sécurité du travail* (CNESST) a copy signed and sealed by an engineer of all drawings and certificates of compliance required pursuant to the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety Code for the Construction Industry) or by any other legislation or regulation or by any other clause in the Specifications or in the Contract. The Contractor must also submit a certificate of conformity signed by an engineer once the facility for which these drawings were prepared has been completed

and before a person uses the facility. A copy of these documents must always be available on site.

1.3 FILING OF NOTICE OF CONSTRUCTION SITE OPENING

.1 Notice of construction site opening must be submitted to the CNESST before Work begins. A copy of such notice and acknowledgment of receipt from the CNESST must be submitted to Departmental Representative.

.2 At the completion of all the work, a notice of construction site closing must be submitted to the CNESST, with a copy to Departmental Representative.

.3 The Contractor must assume the role of being the Principal Contractor in the limits of the construction site and elsewhere where he must execute work within the framework of this project. The Contractor must recognize the responsibility of being the Principal Contractor of the project and identify himself as such in the notice of the construction site opening he provides to the CNESST.

.4 The Contractor must always accept to divide and identify the construction site adequately to define time and space throughout the course of the project.

1.4 HAZARD ASSESSMENT

.1 The Contractor must perform construction 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.

.2 Contractor's representative with decision power must attend any meetings at which construction site safety and health issues are to be discussed.

.3 If it is anticipated that there will be 25 workers or more on the construction site at any given time, the Contractor must set up a worksite committee and hold meetings as required by the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4) (Safety Code for the Construction Industry). A copy of the minutes of the meetings of the committee must be provided to the Departmental Representative no later than five (5) days after the committee meeting.

1.6 REGULATORY REQUIREMENTS

.1 Comply with all legislation, regulations, and Standards applicable to the construction site and its related activities.

.2 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.

.3 Always use the most recent version of the standards specified in the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety Code for the Construction Industry), notwithstanding the date indicated in that *Code.*

1.7 COMPLIANCE REQUIREMENTS

.1 Comply with the *Loi sur la santé et la sécurité du travail* (L.R.Q., c. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4.) (Safety Code for the Construction Industry) in addition to respecting all the requirements of this specification manual.

1.8 RESPONSIBILITIES

.1 The Contractor must acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the *Loi sur la santé et la sécurité du travail* (L.R.Q., ch. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety Code for the Construction Industry).

.2 The Contractor must be responsible for health and safety of persons on construction site, safety of property on construction site and for the protection of persons adjacent to construction site and the environment to the extent that they may be affected by conduct of the work.

.3 No matter the size or location of the construction site, the Contractor must clearly define the limits of the construction site by physical means and respect all specific regulation requirements applicable in this regard. The means chosen to define the limits of the construction site must be submitted to the Departmental Representative.

.4 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 prevention Plan.

1.9 WORK PERFORMED BY EXTERNAL CONTRACTORS

.1 On this construction site, it is anticipated that some work may be performed by an external contractor that has not been hired by the Contractor.

.2 The Contractor must take the necessary steps to protect the health and safety of external contractors that have no contractual link with the Contractor but have been mandated by the Departmental Representative to perform certain work. In return, these external contractors are obligated to submit to the authority of the Contractor (Principal Contractor). A subordination agreement must be signed by the Contractor and by each external contractor to this effect and submitted to the Departmental Representative prior to the start of the work of each contractor (see the wording in the article "HEALTH AND SAFETY SUBORDINATION AGREEMENT").

1.10 GENERAL REQUIREMENTS

.1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article “HAZARD ASSESSMENT” and the article “RISKS INHERENT TO THE WORKSITE” in this Section. Apply this program in its totality from the start of the project until demobilization of all personnel from the construction site.

.2 The prevention program must take into consideration the specific characteristics of the project and cover all the work to be executed on the construction site.

.3 The safety program must include at least the following:

.1 Company safety and health policy;

.2 Description of the stages of the work;

.3 Total costs, schedule and projected workforce curves;

.4 Flow chart of safety and health responsibilities;

.5 Physical and material layout of the construction site;

.6 Risk assessment for each stage of the work, including preventive measures and the procedures for applying them;

.7 Identification of the preventive measures relative to the specific risks inherent to the worksite indicated in the article “RISKS INHERENT TO THE WORKSITE”;

.8 Identification of preventive measures for health and safety of employees and / or public works site as indicated in the article “SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC”;

.9 Training requirements;

.10 Pprocedures in case of accident/injury;

.11 Written commitment from all parties to comply with the safety program;

.12 Construction site inspection cheklist based on the preventive measures;

.13 Emergency response plan which must contain at least the following:

.1 Construction site evacuation procedures;

.2 Identification of resources (police, firefighters, ambulance services, etc.);

.3 Identification of persons in charge of the construction site;

.4 Identification of the first-aid attendants;

.5 Communication organizational chart (including the person responsible for the site and the Departmental Representative);

.6 Training required for those responsible for applying the plan;

.7 Any other information needed, in the light of the construction site’s characteristics.

.14 If available, the Departmental Representative will provide the evacuation procedures to the Contractor who must then coordinate the construction site procedure with that of the site and submit it to the Departmental Representative.

.4 Departmental Representative may respond in writing, where deficiencies or concerns are noted in the prevention program and may request resubmission with correction of deficiencies or concerns.

.5 In addition to the prevention program, during the course of the work the Contractor must elaborate and submit to the Departmental Representative specific written procedures for any work having a high risk factor of accident (for example: Demolition procedures, specific installation procedures, hoisting plan, procedures for entering a confined space,

procedures for interrupting electric power, etc.) or at the request of the Departmental Representative.

.6 The Contractor must plan and organize work to eliminate the danger at source or ensure collective protection, thereby minimizing the use of personal protective equipment.

.7 Equipment, tools, and protective gear which cannot be installed, fitted, or used without compromising the health or safety of workers or the public, must be deemed inadequate for the work to be executed.

.8 All mechanical equipment (for example, but not limited to: Hoisting devices for persons or materials, excavators, concrete pumps, concrete saws) must be inspected before delivery to the construction site. Before using any mechanical equipment, the Contractor must obtain a certificate of compliance signed by a qualified mechanic dated less than a week prior to the arrival of each piece of equipment on the construction site; the certificate must remain on the construction site and transmitted to the Departmental Representative on demand.

.9 Ensure all inspections (daily, periodic, annual, etc.) for the hoisting devices for persons or materials required by the current standards are carried out and be able to provide a copy of the inspection certificates to the Departmental Representative on demand.

.10 The Departmental Representative can always, if he suspects a malfunction or the risk of an accident, order the immediate stop of any item of equipment and require an inspection by a specialist of his choice.

.11 The Departmental Representative must be consulted for the location of storing gas cylinders and tanks on the construction site.

1.11 RISKS INHERENT TO THE WORKSITE

.1 In addition to the risks related to the tasks to be carried out, personnel responsible for the execution of the work on the construction site will be exposed to the following risks inherent to the area where the work will be executed.

.2 At the worksite there may in particular be the presence of the following:

- .1 Materials containing asbestos;
- .2 Overhead power lines;
- .3 Underground services (electric, gas, vapour, water system, etc.);
- .4 Trees and landscaping to preserve and protect;
- .5 Barbed wire fences.

.3 The Contractor must process to a risk assessment of the site to validate this information and see if other risks are present on the site. He must include in his prevention program all risks that have been identified.

1.12 SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC

.1 Worksite may be occupied by employees and/or the public, even if they do not have access to the Contractor's worksite. The Contractor must consider the following specific requirements for the protection of employees and / or the public:

.1 Construct interior and exterior temporary partitions in compliance with regulations.

.2 These requirements must be included in the Contractor's site-specific safety plan as well as any other measures provided by the Contractor to protect the health and safety of employees and / or the public on the site.

1.13 UNFORESEEN HAZARDS

.1 Whenever a source of danger not defined in the Specifications or identified in the preliminary construction site inspection arises as a result of or in the course of the work, the Contractor must immediately suspend work, notify the person responsible for health and safety on the construction site, take appropriate temporary measures to protect the workers and the public and notify Departmental Representative, both verbally and in writing. Then the Contractor must do the necessary modifications to the prevention program or apply the security measures required in order to resume work.

1.14 PERSON IN CHARGE OF HEALTH AND SAFETY

.1 If the construction site meets the requirements of article 2.5.3 of the *Code the sécurité pour les travaux de construction* (S-2.1, r.4) (Safety Code for the Construction Industry), the Contractor needs to hire a competent person authorized as a safety officer and appoint this person full time from the beginning of the work. This person's tasks must solely be dedicated to the management of health and safety on the construction site. This safety officer must have the following qualifications:

.1 Have a safety officer certificate issued by the CNESST since at least one (1) year;

.2 Have site-related working experience specific to the activities associated with the present project;

.3 Have working knowledge of occupational health and safety regulations in the workplace;

.4 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter the construction site to perform work;

.5 Be responsible for implementing, enforcing in detail and monitoring site-specific Contractor's Health and prevention program;

.6 Always be on construction site during execution of work;

.7 Inspect the work and ensure compliance with all regulatory requirements and those indicated in the Contract Documents or the site-specific prevention program.

.8 Keep a daily log of actions taken and submitting a copy to Departmental Representative each week.

.2 The safety officer's certificate must be submitted to the Departmental Representative before the start of the Work.

.3 When the hiring of a safety officer is not required or if this person is hired by the Departmental Representative, the Contractor must designate a competent person to supervise and take responsibility for health and safety, no matter the size of the construction site or how many workers are present at the workplace. This person must always be on construction site and be able to take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the construction site and likely to be affected by any of the work. The Contractor must submit the name of this person to the Departmental Representative before the start of work.

1.15 POSTING OF DOCUMENTS

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

.2 At a minimum, the following information and documents must be posted in a location readily accessible to all workers:

.1 Notice of construction site opening;

.2 Identification of principal Contractor;

.3 Company OSH policy;

.4 Site-specific prevention program;

.5 Emergency plan;

.6 Minutes of worksite committee meetings;

.7 Names of worksite committee representatives;

.8 Names of the first-aid attendants;

.9 Action reports and correction notices issued by the CNESST.

1.16 INSPECTION OF THE CONSTRUCTION SITE AND CORRECTION OF NON-COMPLIANCES

.1 Inspect the construction site and complete the construction site inspection checklist and submit it to the Departmental Representative in accordance with the article "ACTION AND INFORMATIONAL SUBMITTALS" in this Section.

.2 Immediately take all necessary measures to correct any situations deemed non-compliant during the inspections mentioned in the previous paragraph or noticed by the Authorities Having Jurisdiction or the Departmental Representative or his agent.

.3 Submit to Departmental Representative written confirmation of all measures taken to correct the situation in case of non-compliance in matters pertaining to health and safety.

.4 The Contractor must give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order cessation and resuming of work as and when deemed necessary or desirable in the interests of safety and health. This person should always act so that the safety and health of the public and construction site workers and environmental protection take precedence over cost and scheduling considerations.

.5 The Departmental Representative or his agent may order cessation of work if the Contractor does not make the corrections needed to conditions deemed non-compliant in matters pertaining to health and safety. Without limiting the scope of the preceding articles, the Departmental Representative may order cessation of work if, in his view, there is any hazard or threat to the safety or health of construction site personnel or the public or to the environment.

1.17 PREVENTION OF VIOLENCE

.1 Health and safety management of Public Works and Government Services Canada construction sites includeS the implementation of measures designed to protect the psychological health of all persons who access the construction site where the work is taking place. Consequently, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the construction site. Any person who demonstrates such actions or behaviors will receive a warning and/or could be expelled from the construction site by the Departmental Representative.

1.18 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.19 POWDER ACTUATED DEVICE

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

.2 Any person using an explosive actuated tool must hold a training certificate and meet all requirements of Section 7 of the *Code the sécurité pour les travaux de construction* (S- 2.1, r. 4). (Safety Code for the Construction Industry)

.3 Any other explosive-actuated device must be used in accordance with the manufacturer's directions and applicable Standards and Regulations.

1.20 USE OF PUBLIC ROADS

.1 Where it is necessary to encroach on a public road for operational reasons or to ensure the security of the workers, the occupants or the public (for example: Use of scaffolding, cranes, excavation work, etc.), the Contractor must obtain at his own expense any authorizations and permits required by the competent authority.

.2 The Contractor must install at his own expense any signage, barricades, or other devices needed to ensure the safety and security of the public and the Contractor's own facilities.

1.21 LOCKOUT-TAGOUT

.1 For all work on electrically or otherwise energized equipment, the Contractor must draw up and implement a general lockout-tagout procedure and submit it to the Departmental Representative.

.2 Supervisors and all workers concerned by work requiring lockout-tagout must have received training on lockout-tagout procedures by a recognized organization; Contractor must submit training certificates to the Departmental Representative.

.3 Before starting the lockout-tagout procedure of a item of equipment on an occupied site, Contractor must coordinate his work with the representative of the site if the interruption of the power sources can have an impact on the operations of the site or on its occupants.

.4 Contractor must designate a qualified person as responsible for the lockout-tagout and must make sure that that person prepares a lockout-tagout data sheet for each piece of equipment involved. The lockout-tagout data sheet must be submitted to the Departmental Representative at least 48 hours before the beginning of the work. The Departmental Representative will review the data sheet with the representative of the site if the work takes place in an existing building.

.5 The data sheets for lockout-tagout must contain at least the following information:

- .1 Description of work to carry out;
- .2 Identification, description, and location of the circuit and/or equipment to lockout-tagout;
- .3 Identification of energy sources that feeds the equipment;
- .4 Identification of each cutout point;
- .5 Sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;
- .6 List of material needed for the lockout-tagout;
- .7 Method of verification of zero energy implementation;
- .8 Name and signature of the person who prepared the data sheet.

.6 When required by the Departmental Representative, Contractor must record all this information on the site’s representative form.

.7 At the time of lockout-tagout, the person responsible must date the data sheet and ensure that each worker involved in the work on the circuit/equipment to lockout-tagout puts his name on the data sheet and signs it.

1.22 ELECTRICAL WORK

.1 Contractor must ensure that all electrical work is executed by qualified employees in accordance with the provincial regulation respecting vocational training and qualification.

.2 Contractor must respect all requirements of Standard CSA Z462 *Workplace Electrical Safety Standard*.

.3 No repairs or alterations must be carried out on any live equipment, except where complete disconnection of the equipment is not feasible.

.4 Contractor must respect all requirements prescribed in paragraph “LOCKOUT-TAGOUT” in this Section.

.5 Contractor must advise in writing the Departmental Representative of all work which cannot be done with de-energized equipment and obtain his authorization. Contractor must demonstrate to the Departmental Representative that it is impossible to do the work with de-energized equipment and provide all the information necessary to request and obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) before the beginning of the work, excluding for the exceptions indicated in Standard CSA Z462 - Workplace Electrical Safety.

.6 The energized electrical work permit on must contain at least the following elements:

.1 Description of the circuit and equipment and its location;

.2 Justification d for having to do the work in an energized condition;

.3 Description of safe work practices to apply;

.4 Results of the shock hazard analysis;

.5 Limit of the protective perimeter against electric shocks;

.6 Results of the arc flash hazard analysis;

.7 Description of the arc flash protection boundary;

.8 Description of the personal protective equipment required;

.9 Description of the means to limit access to unqualified persons;

.10 Proof that an information session has been carried out;

.11 Approval signature of the energized electrical work (by a person in authority or by the Owner).

.7 If for the operational requirements of the occupants of the site the representative of the site requires that the Contractor performs work in an energized condition, the Contractor must obtain all the information required to request and obtain obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) and have it signed by the representative of the site assigned by the Departmental Representative before the beginning of Work.

1.23 ASBESTOS EXPOSURE

.1 The project may involve the manipulation of materials containing asbestos. The wall on which the existing electrical distribution is installed contains small amounts of asbestos. Although it is not required to demolish this wall, the Contractor must take the necessary precautions and carry out works in accordance with regulations and following requirements:

.1 Provide a written procedure for the work, identifying the risk level of the work (low, moderate, high), as defined in Section 3.23 of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety Code for the Construction Industry). This procedure must consider all the requirements of that Section 3.23.

.2 Submit certificates that demonstrate that all workers involved in Work have received training on asbestos hazards and on the procedure required in the preceding paragraph.

.3 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

.2 If the Contractor or the Departmental Representative or his agent discover other materials which are susceptible of containing asbestos, the Contractor must immediately stop the work and advise the Departmental Representative. If more investigation demonstrates that the materials do contain asbestos, the Contractor must comply with the same requirements dictated above.

1.24 FUNGAL CONTAMINATION

.1 It is not anticipated that Work covered by the present specifications involves the manipulation of materials contaminated by mould; however, if the Contractor or the Departmental Representative or his agent discover materials which are susceptible of being contaminated by mould, the Contractor must immediately stop the work and advise the Departmental Representative. If more investigation demonstrates that the materials do contain mould, the Contractor must comply with the following requirements.

.1 Prior to starting any work where workers are likely to be in contact with materials contaminated by mould, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety Code for the Construction Industry), as well as the requirements indicated in the document "*Mould Guidelines for the Canadian Construction Industry*" published by the Canadian Construction Association (http://www.cca-acc.com/documents/electronic/cca82/cca82.pdf).

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.25 EXPOSURE TO SILICA

.1 Work in wet environment or use tools with the inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high-efficiency filters not to propagate dust in the environment.

.2 Clean surfaces and tools with water, never with compressed air.

.3 Sand and pickle surfaces by using an abrasive containing less than 1% of silica (also called amorphous silica).

.4 Install shields or other containment device to prevent silica dust from migrating toward other workers or the public.

.5 Wear individual respiratory and ocular protection equipment during all the operations that could generate silica dust in accordance with the requirements of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety Code for the Construction Industry).

.6 Wear coveralls to prevent contamination outside the construction site.

.7 Do not eat, drink, or smoke in a dusty environment.

.8 Wash the hands and the face before drinking, eating, or smoking.

1.26 EXPOSURE TO ANIMAL'S FECAL DROPPINGS

.1 Prior to all work where workers are likely to meet materials contaminated by animal's fecal droppings, the Contractor must:

.1 Provide a written procedure for the work which respects all the requirements of the *Code the sécurité pour les travaux de construction* S-2.1, r- 4, (Safety Code for the Construction Industry), as well as the requirements indicated in the document "*Des fientes de pigeons dans votre lieu de travail: méfiez-vous"* (Pigeon droppings in your workplace: Beware" published by the CNESST (http://www.csst.qc.ca/publications/100/Documents/DC100_1331_1web2.pdf).

.2 Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.

1.27 RESPIRATORORY PROTECTION

.1 Contractor must ensure that all workers who must wear a respirator as part of their duties have received training for that purpose as well as fit testing of their respirator, in accordance with CSA Standard Z94.4 - *Selection, Use and Care of Respirators*. Submit the certificates of the fit testings to the Departmental Representative on demand.

1.28 FALL PROTECTION

.1 Plan and organize work to eliminate the risk of fall at the source or ensure collective protection, thereby minimizing the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness that complies with CSA Standard CAN/CSA Z-259.10 M90. A safety belt must not be used as fall protection.

.2 Every person using an elevating platform (scissors, telescopic mast, articulated mast, rotative mast, etc.) must have a training regarding this equipment.

.3 The use of a safety harness is mandatory for all elevating platforms with telescopic, articulate or rotative mast.

.4 Define the limits of the danger zone around each elevating platform.

.5 All openings in a floor or roof must be surrounded by a guardrail or provided with a cover fixed to the floor able to withstand the loads to which it could be exposed, regardless of the size of the opening and the height of the fall it represents.

.6 Everyone who works within two metres from a fall hazard of 3 metres or more must use a safety harness in accordance with the requirements of the regulation, unless there is a guardrail or another device offering an equivalent safety.

.7 Despite the requirements of the regulation, the Departmental Representative may require the installation of a guardrail or the use of a safety harness for specific situations presenting a risk of fall less than three metres.

1.29 SCAFFOLDINGS

.1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry), the Contractor who uses scaffoldings must respect the following requirements:

.1 Foundation:

.1 Scaffoldings must be installed on a solid foundation so that it does not slip or rock;

.2 Contractors wishing to install scaffoldings on a roof, overhang, canopy, or awning must submit their calculations and loads, as well as drawings signed and sealed by an engineer to the Departmental Representative and obtain his authorization before beginning installation.

.2 Assembly, bracing and mooring:

.1 All scaffoldings must be assembled, braced, and moored in accordance with the manufacturer's instructions and the provisions of the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry);

.2 Where a situation requires the removal of part of the scaffoldings (e.g., crosspieces), the Contractor must submit to the Departmental Representative an assembly procedure signed and sealed by an engineer certifying that the scaffolding assembled in that manner will allow the work to be done safely given the loads to which it will be subject;

.3 For scaffoldings where the span between two supports is greater than three metres, the Contractor must provide the Departmental Representative an assembly plan signed and sealed by an engineer.

.3 Protection agains falls during assembly:

.1 Workers exposed to the risk of falling more than 3 metres must always be protected against falls during assembly.

.4 Platforms:

.1 Scaffolding platforms must be designed and installed in accordance with the provisions of the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry);

.2 If planks are used, they must be approved and stamped in accordance with Section 3.9.8 of the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry;

.3 Scaffoldings of four (4) sections (or 6 metres) high or more must have a full platform covering the entire surface between the putlogs every 3 metres high or fraction thereof, and the components of that platform must not be moved at any time to create an intermediate landing.

.5 Guardrails:

.1 A guardrail must be installed on every landing;

.2 Cross braces must not be considered as guardrails;

.3 If the platforms are not covering the entire surface between the putlogs, the guardrail must be installed just above the edge of the platform so that

there is no empty horizontal space between the platform and the guardrail;

.4 Where scaffoldings have four (4) sections (or 6 metres) high or more and full platforms are required, the guardrails must be installed on each landing at the start of work and must remain in place until the work is completed.

.6 Access:

.1 The Contractor must ensure that access to the scaffoldings does not compromise worker safety;

.2 Where the platforms of the scaffoldings are comprised of planks, ladders must be installed in such a way that planks extending beyond the platform do not block the way up or down;

.3 Notwithstanding the provisions of the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry), stairs must be installed on all scaffoldings that have six or more rows of uprights or is six (6) sections (or 9 metres) high or higher.

.7 Protection of the public and occupants:

.1 When scaffoldings are installed in a zone accessible to the public, the Contractor must take the necessary measures to prevent the public from having access to them and, if applicable, to the work or storage area located in the vicinity of these scaffolding;

.2 Contractor must install covered walkways, nets, or other similar devices to protect workers, public, and occupants against falling objects. The means of protection must be approved by the Departmental representative.

.8 Engineering drawings:

.1 In addition to those required by the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry), the Departmental Representative reserves the right to require engineering plans for other types or configurations of scaffoldings;

.2 A drawing signed and sealed by an engineer is required for all scaffoldings that will be covered with a canvas, a tarpaulin, or any other material that has wind resistance;

.3 A certificate of conformity signed by an engineer is required in all cases where an engineering drawing is required before anybody uses the facility. A copy of these documents must always be available on the construction site .

1.30 EXCAVATION WORK

.1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety Code for the Construction Industry), the Contractor who performs the digging of trenches or excavations must respect the following requirements:

.1 Fill out the following form and submit it to the Departmental Representative before beginning to excavation work;

.2 Therefore, submit to the Departmental Representative, as appropriate, the following documents:

.1 Drawings and specifications, signed and sealed by an engineer, of the shoring needed to be installed for the excavation work; or

.2 Engineer’s advice specifying the wall angles of the trench or excavation.

CSST

Excavation guidelines

N° ____ of ____

This directive is provided as an example by the Commission de la santé et de la sécurité du travail (CSST). It contains the main instructions that the employer should give to the person responsible for the work on the site and to the operator of the earth-moving machine.

Company name	
Project name	Project no.
Address of the site	Construction start date

Field survey

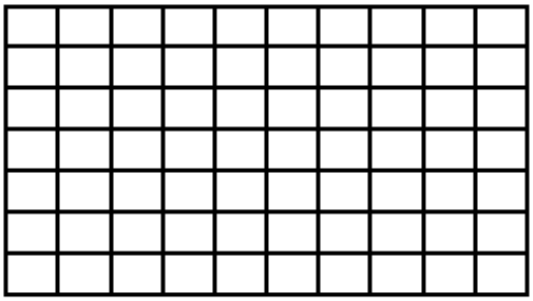
Chaining or axes : from _____ to _____ Attached plan ☐ Plan no. : _____

Working method to use

While making sure the excavation walls do not pose the risk of landslide

- ☐ dig and shore according to the plans and specifications of the engineer ;
- ☐ dig and shore using a trench box ;
- ☐ dig without shoring as long as one of the following conditions is respected:
  - ☐ rock is sound;
  - ☐ no worker goes down in the trench or excavation;
  - ☐ the walls are dug according to the engineer's advice.

Dimensions of excavation (Dig according to the following profile.)



	Minimum	Maximum
H Depth		
Wb Width at bottom Width at top		

Safety measures

Deposit the materials at a distance of at least 1.2 metre (4 feet) from top of walls.
Do not allowed any vehicle to come closer than 3 metres (10 feet) from top of walls.

- ☐ Respect the engineer's plan concerning work in the proximity of an existing facility.
- ☐ Follow the location plan to locate the underground infrastructures.
- ☐ Install signaling devices prescribed in the traffic plan (barriers, visual references, etc.).
- ☐ Assign a flag person or more to control the flow of traffic.
- ☐ Respect the procedure prescribes for work near power lines.
- ☐ Provide protection devices for the workers, such as concrete crash barriers.

Name	Occupation	
Signature	Date	Telephone no.

Directive submitted
☐ to the responsible of the work on the site ☐ to the operator of the earth-moving machine

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1.31 LIFTING LOADS WITH CRANE OR BOOM TRUCK

.1 Unless specified otherwise, the Contractor must prepare a hoisting plan and submit it to the Departmental Representative for all lifting operations done with a crane or a boom truck at least five (5) days before these lifting operations begin. The hoisting plan must contain at a minimum the information listed at the end of this article.

.2 The hoisting plan must be signed and sealed by an engineer for the following lifting operations:

- .1 Lifting of concrete panels;
- .2 Lifting mechanical/electrical equipment on a roof or on the floor of a building;
- .3 Lifting of loads encroaching on the public road;
- .4 Lifting large dimensions or very heavy loads;
- .5 All other lifting operation, in accordance with the requirements of the Departmental Representative.

.3 In addition to the above requirements, the Contractor must plan the hoisting operations in a way as to avoid that the loads pass over the occupied zones on the site. When there is no alternative, the hoisting plan must absolutely be signed and sealed by an engineer and must guarantee the security of the occupants in that zone; the plan must also be approved by the Departmental Representative. The Departmental Representative can, if he deems necessary, require that the work be done at night or on weekends.

.4 Upon the beginning of the work on the construction site, the Contractor must submit the list of the hoisting plans anticipated for the whole project to the Departmental Representative. That list must be updated as needed if changes occur during the work.

.5 In addition to the mechanical service inspection certificate, the annual inspection certificate and the crane logbook must be aboard all cranes and boom truck cabs.

.6 The entire lifting area must be marked off to prevent the entry of non-authorized persons.

.7 The Contractor must carefully inspect all slings and lifting accessories and make sure that those in poor condition are destroyed and scrapped.

.8 Compressed-gas cylinders must be lifted with a basket specially designed for this purpose.

.9 Minimum content of hoisting plan:

- .1 Sketch indicating at a minimum, the location of the crane, the surrounding facilities, the zone covered by the hoisting operations, the pedestrian’s pathways and vehicular routes, the security perimeter, etc.
- .2 Weight of loads.
- .3 Dimensions of loads.
- .4 List of hoisting devices and weight of each.
- .5 Total weight lifted.
- .6 Maximum height of obstacles to clear.
- .7 Height of loads lifting relative to the surface of the roof (in the case of loads to be placed on roofs).

.8 Use of guide cables.

.9 Type of crane used.

.10 Crane capacity.

.11 Boom length.

.12 Boom angle.

.13 Crane's radius of action.

.14 Deployment of stabilizers.

.15 Percentage usage of the crane's capacity.

.16 Verification confirmation of hoisting equipment.

.17 Identification of the crane operator and the person responsible for the hoisting operations with date and signatures.

1.32 HOT WORK

.1 Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning, heating, etc.

.1 Before the beginning of each shift of work and for each sector, the Contractor must obtain a "Hot Work Permit" emitted by the person responsible for the site.

.2 A working portable fire extinguisher suitable to the fire risk must be available and easily accessible within a 5 m radius from any flame, spark source or intense heat.

.3 The Contractor must appoint an individual to do continuous monitoring of the fire risks for a period of one (1) hour after the end of the shift of hot work. This individual must sign the section for this purpose on the permit and give it to the person in charge of the construction site after the one-hour period.

.4 When the hot work is done in areas where there are combustible materials or where the walls, ceilings, or floors are made of or covered with combustible materials, a final inspection of the work area must be scheduled four (4) hours after the work has finished. Unless specified otherwise by the Departmental Representative, the Contractor must assign a person to carry out this monitoring.

.2 Welding and cutting: In addition to the requirements prescribed in the preceding paragraphs, the Contractor must respect the following requirements:

.1 Welding and cutting work must be carried out in accordance with the requirements of the *Code de Sécurité pour les travaux de construction, S-2.1, r.4* (Safety Code for the Construction Industry) and CSA standard W117.2, Safety in Cutting, Welding and Allied Processes;

.2 Air extraction system with filters must be used for all welding and cutting work performed inside;

.3 Stop all activities producing flammable or combustible gas, vapours, or dust in the vicinity of the welding or cutting work;

.4 Store all compressed gas cylinder on a fireproof fabric and make sure that the room is well ventilated;

.5 Store all oxygen cylinders more than 6 metres from a flammable gas cylinder (ex: acetylene) or a combustible such as oil or grease, unless the oxygen cylinder is separated from it by a wall made of non-combustible material as mentioned in Article 3.13.4 of the *Code de sécurité pour les travaux de construction, S-2, r. 6* (Safety Code for the Construction Industry);

.6 Store the cylinders far from all heat sources;

.7 Not to store the cylinders close to the staircases, exits, corridors, and elevators;

.8 Do not put acetylene in contact with metals, such as silver, mercury, copper, and alloys of brass having more than 65% copper, to avoid the risk of an explosive reaction;

.9 Check that welding equipment with electric arc has the necessary tension and are grounded;

.10 Ensure that the conducting wires of the electric welding equipment are not damaged;

.11 Place the welding equipment on a flat ground away from the bad weather;

.12 Install fireproof canvas when the welding work is done in a superposition and where there is the risk of falling sparks;

.13 Move away or protect the combustible materials which are closer than 15 metres from the welding work;

.14 Prohibition to weld or cut any closed container;

.15 Do not perform any cutting, welding, or work with a naked flame on a container, a tank, a pipe, or other container containing a flammable or explosive substance unless:

.1 They have been cleaned and air samples indicating that work can be done without danger has been taken; and

.2 Provisions to ensure the safety of the workers have been made.

1.33 INTERIOR USE OF INTERNAL COMBUSTION ENGINES

.1 In addition to respecting article 3.10.17 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety Code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.

.2 The use of a gas-powered equipment inside a building is prohibited even if the building is provided with openings.

.3 The use of other equipment powered by an internal combustion engine inside a building must be submitted to the approval of the Departmental Representative.

.4 For the use of any piece of equipment powered by an internal combustion engine inside a building, even if the building is provided with openings, the Contractor must install a ventilation system able to maintain the concentrations of toxic gases below the regulatory values. The stale air must be exhausted outside the building.

.1 Before using equipment powered by an internal combustion engine, the Contractor must plan and write the following:

.1 Number of fans to install;

.2 Power of the fans;

.3 Location of the fans;

.4 Dimensions of the openings that will be open during the work.

.5 During the operation of equipment with internal combustion engine, the Contractor must measure the concentrations of carbon monoxide and nitrogen oxides in the work area and at the breathing area of the workers; the concentration levels measured must be recorded in a register every 30 minutes that must be available for consultation.

.6 If work is in an occupied building, the Contractor must also measure the concentrations of carbon monoxide and nitrogen oxides in the rooms next to the work area and the concentration levels measured must be recorded in a register every 30 minutes.

.7 If the carbon monoxide or nitrogen oxides detector alarm goes off during the work, the Contractor must stop the work and take the corrective measures required before resuming the work.

.8 A portable fire extinguisher must always be available in the work area during the use of equipment with internal combustion engines.

.9 The equipment must be maintained at a safe distance from all combustible material.

.10 The storage of fuel for any equipment with internal combustion engine is prohibited inside a building.

1.34 WORK NEAR OVERHEAD POWER LINES

.1 When there is an overhead power line in the work zone and that the Contractor chooses to apply paragraph b) of article 5.2.2 of the *Code de sécurité pour les travaux de construction* (2.1, r.4) (Safety Code for the Construction Industry), a copy of the agreement with the electrical power company and a copy of the work process, required in Article 5.2.2 b), must be submitted to the Departmental Representative before the beginning of the work in relation to these documents.

1.35 HEALTH AND SAFETY SUBORDINATION AGREEMENT

.1 Agreement to fill out next page; a completed and signed copy to be submitted to the Departmental Representative.

HEALTH AND SAFETY SUBORDINATION AGREEMENT

Project: _____ Address: _____

EXTERNAL CONTRACTOR

I, hereby, agree to submit to the authority of (name of the Principal Contractor's business)

_____, which is the Principal Contractor for the project indicated above during the entire duration of our work on the construction site. Accordingly, I confirm that I have reviewed the Principal Contractor's prevention program, and I agree to:

- Inform my employees of the content of the Principal Contractor's prevention program and ensure that its content is complied with at all times;
- Apply the prevention program that is specific to the activities that we carry out under this project;
- Inform the Principal Contractor of my actions or dealings on the construction site and obtain the Principal Contractor's agreement before the start of work; and
- Follow the health and safety directives provided by the representative of the Principal Contractor on the construction site and, depending on requirements, attend training sessions and health and safety meetings organized by the representative of the Principal Contractor.

Name of Representative:	Name of Business:
Description of work to be done on the construction site:	
Approximate dates of work (start-end): Start:	End:

_____ _____

Signature Date

PRINCIPAL CONTRACTOR

I hereby agree to allow the business (name of external contractor) _____ to perform the work under this project indicated above and, as Principal Contractor, to take the necessary steps to protect the health and safety of workers on the construction site. Should the Contractor repeatedly refuse or fail to comply with my directives, I agree to inform PWGSC's Departmental Representative of this and to provide documentary evidence of my actions or dealings with the Contractor.

Name of Representative:	Name of Principal Contractor's Business:

Signature: _____ Date: _____

Submit a completed and signed copy to Departmental Representative

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Definitions:

.1 Pollution and environmental damage: Presence of chemical, physical, or biological elements or agents that have a detrimental effect on the health and well-being of people, which alter the ecological balances important to humans and which constitute an attack on species that play an important role in the latter or degrade the aesthetic, cultural, or historical characteristics of the environment.

.2 Protection of the environment: Prevention/control of pollution and disturbance of habitat and environment during construction.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water.

.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

.2 EPA General Construction Permit (GCP) 2012.

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

.2 Submit two (2) copies of WHMIS Safety Data Sheets (SDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting

requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, and EPA 832/R-92-005, Chapter 3.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials, including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

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

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on Project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Wastewater Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources, and wetlands plan.

.15 Pesticide treatment plan to be included and updated, as required.

1.3 FIRES

.1 Fires and burning of rubbish onsite are not permitted.

1.4 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 US EPA General Construction Permit.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

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

.4 Ensure pumped water into waterways, sewer, or drainage systems is free of suspended materials.

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

1.5 POLLUTION CONTROL

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

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

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where indicated directed by Departmental Representative.

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

1.6 NON-COMPLIANCE

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan.

.2 Contractor: After receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Act only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Bury rubbish and waste materials onsite where directed after receipt of written approval from Departmental Representative.

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

.4 Final Cleaning: Upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.5 Waste Management: Separate waste materials for recycling in accordance with Section 01 74 19 - 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 INSPECTION

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

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

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

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

1.2 INDEPENDENT INSPECTION AGENCIES

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

.2 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 reinspection.

1.3 ACCESS TO WORK

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

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

1.4 PROCEDURES

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

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

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

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or 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 will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 REPORTS

.1 Submit an electronic copy of test and inspection reports to Departmental Representative.

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

1.7 FACTORY TESTS

.1 Submit certificates of factory tests that are prescribed in the various sections of the Specifications, within a maximum of one (1) week from the date of the tests.

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 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 Departmental Representative will provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance, and removal.

1.4 HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance, and fuel.

.2 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.3 Maintain temperatures of minimum 10°C in areas where construction is in progress.

.4 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.

.5 Permanent heating system of building to be used when available. Be responsible for damage to heating system if use is permitted.

.6 Pay costs for maintaining temporary heat, when using permanent heating system.

.7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable Codes and Standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 POWER AND LIGHT

.1 Supply of electricity and lighting to perform the Work is Contractor's responsibility. Contractor must make a connection request to the utility company.

.2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance, and removal, including necessary equipment (e.g.: Breakers, conduits, cables, etc.).

.3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

1.6 COMMUNICATION FACILITIES

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

1.7 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction 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 REFERENCE STANDARDS

.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 CSA Group (CSA).

.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.

.3 U.S. Environmental Protection Agency (EPA)/Office of Water.

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 INSTALLATION AND REMOVAL

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

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

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.3 SCAFFOLDING

.1 Scaffolding: In accordance with CAN/CSA-S269.2.

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

1.4 HOISTING

.1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists cranes to be operated by qualified operator.

1.5 SITE STORAGE/LOADING

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

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

1.6 CONSTRUCTION PARKING

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

.2 Provide and maintain adequate access to project site.

.3 Clean airport runways and taxi areas where used by Contractor's equipment. Contractor is responsible for cleaning taxiway, apron, and runway before each aircraft movement.

1.7 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.8 OFFICES

.1 Provide office of sufficient size to accommodate site meetings and furnished with drawing laydown table.

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

.3 Maintain in clean condition.

1.9 EQUIPMENT, TOOL, AND MATERIAL STORAGE

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

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

1.10 SANITARY FACILITIES

.1 Existing sanitary facilities can be used.

1.11 CONSTRUCTION SIGNAGE

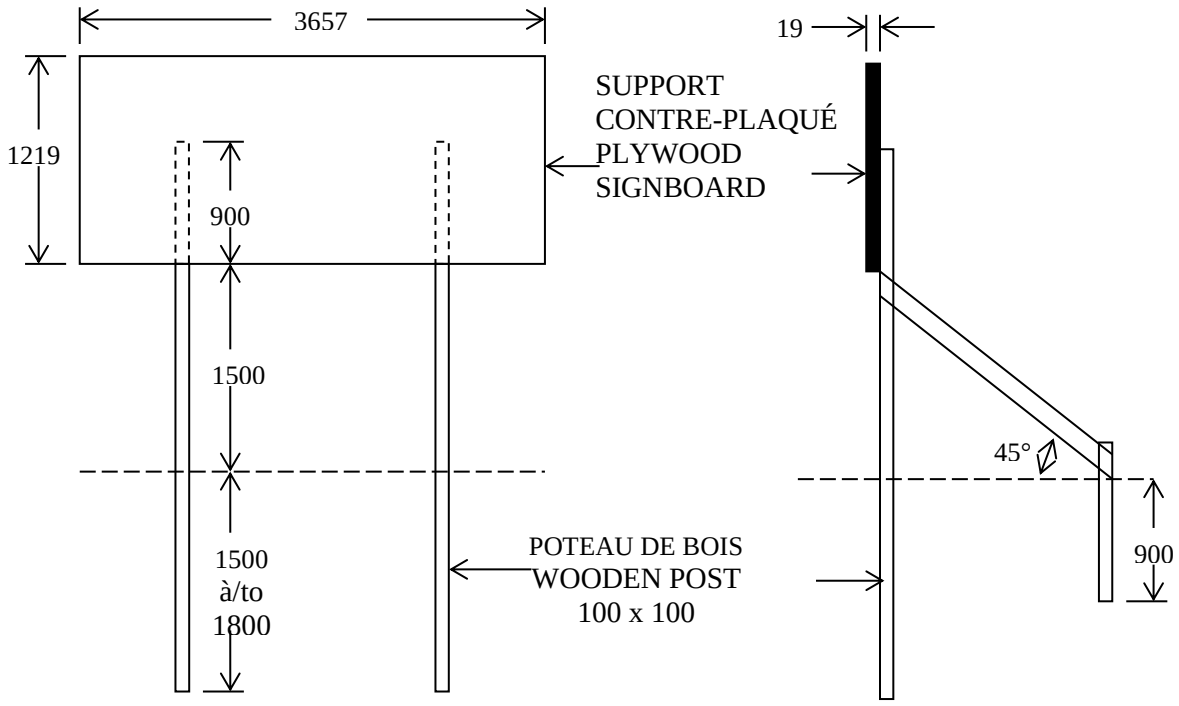
.1 Provide and erect project sign, as shown below, within three (3) weeks of signing Contract, in a location designated by Departmental Representative.

.2 Construction sign 3.6 m x 1.2 m, of wood frame, complying with drawing provided by the Departmental Representative.

.3 Paint all apparent items:

.1 Alkyd paint without silicone: To CAN/CGSB-1.59M89.

.2 Primer: To CGSB 1-GP189M-Aug. 1984.



.4 Departmental Representative to provide self-adhesive film to affix to panel.

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

.6 Signs and notices for safety and instruction in both official languages. Graphic symbols to CAN/CSA-Z321.

.7 Maintain approved signs and notices in good condition for duration of project and dispose of off site at final acceptance of works.

.8 Install a contour molding on the panel to prevent the film from being blown off by the wind.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

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

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

.9 Dust Control: Adequate to always ensure safe operation.

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

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

.12 Provide snow removal during period of Work.

.13 Remove, upon completion of Work, haul roads designated by Departmental Representative.

1.13 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 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB).

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

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

.2 CSA Group (CSA).

.1 CSA-O121-M1978 (R2003), Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 GUARD RAILS AND BARRICADES

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

.2 Provide as required by governing authorities.

1.4 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators.

1.5 FIRE ROUTES

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

1.6 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.

1.7 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 three (3) days prior to installation.

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

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 REFERENCE STANDARDS

.1 Reference Standard may be provided in each Section.

.2 Comply with these Reference Standards, in whole or in part, as specifically requested in specifications.

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

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

1.2 QUALITY

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

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

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

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

.5 Unless otherwise indicated in Specifications, maintain uniformity of manufacture 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 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 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, 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, 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.

1.5 TRANSPORTATION

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

1.6 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.7 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.

1.8 CO-ORDINATION

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

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

1.9 REMEDIAL WORK

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

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

1.10 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 - GENERAL

.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 parts of building. Do not cut, drill or sleeve 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 pedestrian and vehicular traffic and/or 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 ACTION AND INFORMATIONAL 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 elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner 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 Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Material/equipment required for identical installation.

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

1.3 PREPARATION WORK

.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 are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION OF WORK

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

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

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

.11 Using construction joint fire stops and building perimeter fire stops to protect gaps at fire separations and between fire separations and other construction assemblies.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling reuse in accordance with Section 01 74 19 - 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, other than those caused by Departmental Representative or other Contractors. Protect materials and other components from movement caused by wind so as not to present risk to aircrafts.

.2 Remove waste materials from site daily after each work shift or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Make arrangements with and obtain permits from Authorities Having Jurisdiction for disposal of waste and debris.

.4 Provide, onsite, containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.

.6 Dispose of waste materials and debris off site at designated dumping areas on Crown properties.

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

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

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

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

.11 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 other than including that caused by Owner or other contractors.

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

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

.7 Remove stains, spots, marks, dust, and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

.8 Clean lighting reflectors, lenses, and other lighting surfaces.

.9 Vacuum clean and dust building interiors, behind grilles, louvres, and screens.

.10 Wax, seal, shampoo, or prepare floor finishes, as recommended by manufacturer.

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

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

.13 Remove dirt and other disfiguration from exterior surfaces.

.14 Clean and sweep roofs, gutters, areaways, and sunken wells.

.15 Sweep and wash clean paved areas.

.16 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.17 Clean roofs, downspouts, and drainage systems.

.18 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.19 Remove snow and ice from access to building.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse recycling in accordance with Section 01 74 19 - 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 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants, or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling operations, repair, and demolition.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.

.4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.5 Non-toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

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

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the project site.

.11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOCs): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings.

.2 Wood preservatives; strippers and household cleaners.

.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOCs can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project and ensure that requirements of the Construction Waste Management Plan are followed.

.2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 - Project Meetings before starting any Work of the Contract attended by the Departmental Representative, the Contractor, and Subcontractors, to discuss the Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.3 QUALITY ASSURANCE

.1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:

.1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials and incorporate into CWM Plan.

.2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable Regulations.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 (CWM PLAN) IMPLEMENTATION

.1 Manager: Contractor is responsible for designating an onsite party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

.2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Departmental Representative, and other site personnel, as required, to maintain CWM Plan.

.3 Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the Project to Subcontractor's at appropriate stages of the Project.

.4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting, and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local Regulations.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act (CEPA).

.1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

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

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

.2 Request Departmental Representative's inspection.

.2 Departmental Representative 's Inspection:

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

.2 Contractor to correct Work as directed.

.3 Completion Tasks: Submit written certificates that tasks have been performed as follows:

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

.2 Defects: Corrected and deficiencies completed.

.3 Equipment and systems: Tested, balanced adjusted, and fully operational.

.4 Certificates required by Utility companies submitted.

.5 Operation of systems: Demonstrated to Owner's personnel.

.6 Commissioning of mechanical systems: Completed in accordance with Section 01 91 13 - General commissioning requirements and one (1) copie of final Commissioning Report submitted to Departmental Representative.

.7 Aboveground Underground storage tank inspection documentation, registration, forms, decommissioning, and removal in accordance with CEPA SOR/2008-197.

.8 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.

1.3 FINAL CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Waste Management: Separate waste materials for recycling reuse in accordance with Section 01 74 19 - 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 REFERENCE STANDARDS

.1 Canadian Environmental Protection Act (CEPA).

.1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 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 warranty requirements manufacturer's installation instructions.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Provide name, telephone number, and address of company authorized for construction warranty work action.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, three final paper copies and one electronic copy of final Operating and Maintenance (O&M) Manuals in French and English.

.3 Provide spare parts, maintenance materials, and special tools of same quality and manufacture as products provided in Work.

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

1.4 FORMAT

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

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

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

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

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

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files, in dwg format, on CD.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: Provide title of project.

.1 Date of submission; names.

.2 Addresses, name, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

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

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

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

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

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

.6 Training: Refer to Section 01 79 00 - Demonstration and Training.

1.6 AS -BUILT DOCUMENTS AND SAMPLES

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

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

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

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry, and legible condition.

.1 Do not use record documents for construction purposes.

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

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings.

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

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

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

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

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

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

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 Referenced Standards to related shop drawings and modifications.

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

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

.2 Changes made by Addenda and change orders.

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

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

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics, and limiting conditions.

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

.2 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.

.1 Include regulation, control, stopping, shutdown, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: Include routine procedures and guide for troubleshooting; 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 Contractor's co-ordination drawings, with installed colour coded piping diagrams.

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

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

.14 Include test and balancing reports as specified in Sections 01 45 00 - Quality Control and 01 91 13 - General Commissioning Requirements.

.15 Aboveground storage tank inspection documentation, registration, forms, decommissioning, and removal in accordance with CEPA SOR/2008-197.

.16 Additional Requirements: As specified in individual Specification.

1.9 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

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

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

.4 Additional Requirements: As specified in individual Specification.

1.10 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual Specification.

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

.3 Deliver to location as directed site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

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

.2 Extra Stock Materials:

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

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

.3 Deliver to location as directed site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

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

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual Specification.

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

.3 Deliver to site location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE, AND HANDLING

.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 paint and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.12 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit Warranty Management Plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain enough detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.6 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 of subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible designated by each one;

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.

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

.5 Co-execute submittals when required.

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

.7 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.

.8 Conduct joint 9-month warranty inspection, measured from time of acceptance, with Departmental Representative.

.9 Include information contained in Warranty Management Plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers, or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, motors, pumps, HVAC balancing, transformers, sprinkler systems, lightning protection systems, alarm systems, commissioned systems fire protection.

.3 Provide list for each warranted equipment, item, feature of construction or system, indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses, and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: Include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 4- and 9-month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected items of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.13 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material;

.2 Model number;

.3 Serial number;

.4 Contract number;
.5 Warranty period;
.6 Inspector's signature;
.7 Contractor's signature.

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 REQUIREMENTS

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative two (2) weeks prior to date of substantial performance final inspection interim completion.

.2 Departmental Representative: Provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation Work:

- .1 Verify conditions for demonstration and instructions comply with requirements.
- .2 Verify designated personnel are present.
- .3 Ensure equipment has been inspected and put into operation.
- .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning Requirements, and equipment and systems are fully operational.

.4 Demonstration and Instructions:

- .1 Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment at agreed upon scheduled times, at the equipment designated location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review in detail contents of manual to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: Ensure amount of time required for instruction of each item of equipment or system as follows:

- .1 Constant current regulators: 2 hours;
- .2 ARCAL system and control system: 2 hours;
- .3 Precision approach path indicator (PAPI): 2 hours;
- .4 Runway end identifier lights (REIL): 2 hours;
- .5 Wind cones: 1 hour;
- .6 Lighting adjustments: 2 hours.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed Operation and Maintenance Manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct Departmental Representative's personnel.

.2 Provide written report that demonstration and instructions have been completed.

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 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.

1.2 COMMISSIONING OVERVIEW

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

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

.3 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.

.4 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, and systems have been commissioned.

.3 O&M training has been completed.

1.3 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.

1.4 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 and up-to-dated Cx Plan.

.2 Ensure installation of related components, equipment, sub-systems, systems are completed.

.3 Fully understand Cx requirements and procedures.

.4 Have Cx documentation shelf ready.

.5 Understand completely Design Criteria and Intent and special features.

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

.7 Have Cx schedules up-to-date.

.8 Ensure systems have been cleaned thoroughly.

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

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

1.5 CONFLICTS

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

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

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Submit no later than four (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 at least eight (8) weeks prior to start of Cx.

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

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

1.7 COMMISSIONING DOCUMENTATION

.1 Departmental Representative to review and approve Cx documentation.

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

1.8 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.16 - Construction Progress Schedule - Critical Path Method (CPM).

.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.

1.9 STARTING AND TESTING

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

1.10 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice prior to commencement.

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

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

1.11 MANUFACTURERS' 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, start-up, and operations instructions prior to start-up 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 start-up.

.3 Integrity of warranties:

- .1 Use manufacturer's trained start-up 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.

1.12 PROCEDURES

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

.2 Conduct start-up and 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 Start-up: Follow accepted start-up procedures.
- .3 Operational testing: Document equipment performance.
- .4 System PV: Include repetition of tests after correcting deficiencies.
- .5 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 require tests on approved PV forms.

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

.1 Less important equipment/system: Implement corrective measures approved by the Departmental Representative;

.2 Important equipment/systems: If the reassessment shows that the damages causes are minor, implement corrective measures approved by the Departmental Representative.

.3 If the reassessment shows the existence of major damages, the Departmental Representative will refuse the equipment/system.

.1 Equipment/system refused: To be removed from site and replaced by a new one.

.2 Resubmit new equipment/system to prescribed Cx procedures.

1.13 START-UP DOCUMENTATION

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

.2 Start-up documentation to include:

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

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up check lists.

.4 Start-up reports.

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

1.14 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer, develop written maintenance program and submit to 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.

1.15 TEST RESULTS

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

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

1.16 START OF COMMISSIONING

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

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

1.17 INSTRUMENTS/EQUIPMENT REQUIRED FOR COMMISSIONING

.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 Equipment as required to complete work.

1.18 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under accepted simulated 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.

1.19 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.20 AUTHORITIES HAVING JURISDICTION

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of Authority Having Jurisdiction, arrange for authority to witness procedures 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 five (5) days of test and with Cx report.

1.21 DEFICIENCIES, FAULTS, DEFECTS

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

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

1.22 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.

1.23 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.

1.24 TRAINING

.1 In accordance with Section 01 79 00 - Demonstration and Training.

1.25 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.26 OWNER'S PERFORMANCE TESTING

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

DIVISION 23

Heating, Ventilation, and Air Conditioning (HVAC)

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS,

.1 CSA Group (CSA)

.1 CSA C22.2 No.46-M1988(R2006), Electric Air-Heaters.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250-08, Enclosures for Electrical Equipment (1000 V Maximum).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for unit heaters and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, and cleaning procedures.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for unit heaters for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials, indoors, off ground, in dry location, in clean, dry, well-ventilated area, in accordance with manufacturer's recommendations.

.2 Store and protect unit heaters from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 UNIT HEATERS

.1 Unit Heater: To CSA C22.2 No.46, horizontal discharge, complete with adjustable louvers, finished to match cabinet.

.2 Fan type unit heaters with built-in high-heat limit protection.

.3 Fan Motor: Permanently lubricated ball bearing, mounted on flexible support.

.1 Built-in fan motor thermal overload protection.

.4 Hangers: Wall-mounted.

.5 Elements: Mineral insulated, stainless-steel sheath, with aluminum fins.

.6 Cabinet: Steel, equipped with wall-mounted supports or suspended on rods.

.1 Phosphatized and finished with enamel-paint, baked.

2.2 CONTROLS

.1 Built-in thermostat and support controls.

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 unit heaters installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Suspend unit heaters from ceiling or mount on wall, as indicated.

.2 Make power and control connections.

3.3 FIELD QUALITY CONTROL

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

.2 Test cut-out protection when air movement is obstructed.

.3 Test fan delay switch to assure dissipation of heat after element shutdown.

.4 Test unit cut-off when fan motor overload protection has operated.

.5 Ensure heaters and controls operate correctly.

3.4 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

.3 Waste Management: Separate waste materials for recycling, in accordance with Section 01 74 19 - Waste Management and Disposal.

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

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by unit heaters installation.

END OF SECTION

DIVISION 26

Electrical

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All Sections of Division 01.

1.2 REFERENCE STANDARDS

.1 CSA Group.

.1 CSA C22.10-F18, Canadian Electrical Code, Part 1 (23rd Edition) and modifications of Quebec.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC).

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

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

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

.3 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

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

.4 Certificates:

.1 Provide CSA certified material equipment.

.2 Where CSA certified equipment or material is not available, submit such equipment or material to Authority Having Jurisdiction for approval before delivery to site.

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

.4 Permits and fees: In accordance with General Conditions of Contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from Authority Having Jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: Submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance (O&M) data, for incorporation into manual.

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

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start-up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

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

.4 Post instructions where directed.

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

.6 Ensure operating instructions will not fade when exposed to sunlight.

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location, indoors, off ground, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating Voltages: To CAN3-C235.

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

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language Operating Requirements: Provide identification labels nameplates for control items in French and English.

.4 Use one nameplate label for both languages.

2.2 MATERIALS AND EQUIPMENT

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

.2 Equipment and material to be CSA certified. Where CSA certified equipment and material are not available, obtain special approval from inspection authorities before delivery to site, as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

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

2.4 WARNING SIGNS

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

.2 Oven-dry enamel-paint signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates labels as follows:

.1 Nameplates: 3-mm thick Lamicoid, engraved white inscription, black background, mechanically attached with self-tapping or screws. "P-Touch" labels are not accepted.

.1 For apparatuses connected to the emergency network, nameplates are red with white letterings.

.2 Sizes as follows:

NAMEPLATE SIZES	DIMENSIONS	NUMBER OF LINES	LETTER HEIGHT
1	10 x 50 mm	1	3 mm
2	12 x 70 mm	1	5 mm
3	12 x 70 mm	2	3 mm
4	20 x 90 mm	1	8 mm
5	20 x 90 mm	2	5 mm
6	25 x 100 mm	1	12 mm
7	25 x 100 mm	2	6 mm

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

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

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

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

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. _____. Numbered as per Departmental Representative's instructions.

.7 Disconnects, Starters, and Contactors: Indicate equipment being controlled and voltage.

.8 Terminal Cabinets and Pull Boxes: Indicate system and voltage.

.9 Transformers: Indicate capacity, primary and secondary voltages as well as line and load information.

.10 Commercial labels of contractors executing works are not allowed.

2.7 WIRING IDENTIFICATION

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

.2 Maintain phase sequence and colour coding throughout.

.3 Colour Coding: To CSA C22.1.

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

2.8 CONDUIT AND CABLE IDENTIFICATION

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

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

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

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

2.9 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two (2) coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1.

.2 Paint indoor switchgear and distribution enclosures light gray to ASA 61.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable and allow work to be carried out in accordance with written instructions of manufacturer.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

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

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1, except otherwise specified.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

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

.1 Sleeves through concrete: Plastic pipe, sized for free passage of conduit, and protruding 50 mm on each side.

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

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

3.5 LOCATION OF OUTLETS

.1 Locate outlets and power sockets where indicated.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3,000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms, on latch side.

3.6 MOUNTING HEIGHTS

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

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

.3 Install electrical equipment at following heights, unless indicated otherwise.

.1 Panelboards: As required by Code or as indicated.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.8 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers, and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

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

.1 Power generation distribution system including phasing, voltage, grounding, and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters, and associated control equipment including sequenced operation of systems, where applicable.

.5 Insulation resistance testing:

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

.2 Megger 350-600 V circuits, feeders, and equipment with a 1,000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Departmental Representative.

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

.5 Manufacturer's Field Services:

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

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

3.9 SYSTEM START-UP

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

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

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

3.10 CLEANING

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

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

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

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

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes requirements for selective demolition and removal of electrical components, including removal of conduit, junction boxes, and panels to source (autonomous circuits), and incidentals required to complete work described in this Section ready for new construction.

1.2 RELATED REQUIREMENTS

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

1.3 REFERENCE STANDARDS

.1 CSA Group (CSA).

.1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.4 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.

.4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

.6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985), including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide in accordance with Section 01 33 00 - Submittal Procedures before starting work of this Section:

.1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

.2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: Perform work of this Section in accordance with:

.1 Federal Workers' Compensation Service Provincial/Territorial Workers' Compensation Boards/Commissions.

.2 Government of Canada, Labour Program: Workplace Safety Provincial/Territorial Occupational Health and Safety Standards and Programs.

1.8 SITE CONDITIONS

.1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination.

.2 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform following activities:

.1 Hazardous substances will be as defined in Hazardous Products Act.

.2 Stop work in area of suspected hazardous substances.

.3 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.

.4 Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to Work.

.5 Proceed only after written instructions have been received from Departmental Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

.1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated, to remain Departmental Representative's property.

.2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials.

.1 Salvaged material shall be cleaned and adequately wrapped prior to delivery to Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.

.2 Fire Stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire-rated performance.

Part 3 Execution

3.1 PREPARATION

.1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and proceed as follows:

.1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.

.2 Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

.3 Prevent debris from blocking drainage inlets.

.4 Protect mechanical systems that will remain in operation.

.2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized:

.1 Prevent debris from endangering safe access to and egress from occupied buildings.

.2 Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.2 EXECUTION

.1 Demolition and Removal:

.1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.

.2 Remove existing luminaires, electrical devices, and equipment, including associated conduits, boxes, wiring, and similar items, unless specifically noted otherwise.

.3 Disconnect and remove existing fire alarm system including associated conduits, boxes, wiring, and similar items, unless specifically noted otherwise.

.4 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.

.5 Disconnect and remove telephone outlets, associated conduit, cabling, and subterminal backboards and related accessories; maintain telephone service and main terminal backboard as is.

.6 Perform demolition work in a neat and workmanlike manner:

.1 Remove tools or equipment after completion of work and leave site clean and ready for subsequent renovation work.

.2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

.7 Disconnect panel feeders back to main distribution panel and re label respective circuit breaker as “SPARE”.

.8 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.

.9 Remove existing conduits, boxes, cabling, and wiring associated with removed luminaires, electrical devices, and equipment.

.10 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant.

.11 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.3 CLOSEOUT ACTIVITIES

.1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre).

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA).

.1 CAN/CSA-C22.2 No.18- 98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65- 03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC).

.1 EEMAC 1Y-2- 1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.4 CLOSEOUT SUBMITTALS

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

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, in dry location, indoors, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

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

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

.3 Bushing Stud Connectors: To NEMA and to consist of:

- .1 Connector body and bar clamp for stranded copper conductors bar.
- .2 Bar clamp for copper stranded conductors.
- .3 Bolts for bar clamp.
- .4 Bolts for copper conductors.
- .5 Sized for conductors, as indicated.

.4 Clamps or connectors for TECK cable and flexible conduit, as required by CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors and cables, and proceed as follows:

- .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors;
- .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
- .3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
- .4 Install bushing stud connectors in accordance with NEMA.

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 recycling reuse in accordance with Section 01 74 19 - 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 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group.

.1 CSA C22.2 No.0.3, Test Methods for Electric Wires and Cables.

.2 CAN/CSA 22.2 No.131, Type TECK 90 Cable.

1.3 PRODUCT DATA

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: Remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 BUILDING WIRES

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

.2 Copper Conductors: Size as indicated, 600 V, with insulation of cross-linked thermosetting polyethylene material, rated RW90 XLPE, non jacketted.

2.2 TECK 90 CABLE

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

.2 Conductors:

.1 Grounding conductor: Copper, as indicated.

.2 Circuit conductors: Copper, size as indicated.

.3 Insulation:

.1 Cross-linked polyethylene XLPE.

.2 Rating: 1,000 V.

.4 Inner Jacket: Polyvinyl chloride material.

.5 Armour: Galvanized-steel sheet.

.6 Overall Covering: Thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this Project.

.7 Fastenings:

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

.2 Channel type supports for two or more cables, at 1,500 mm centre-to-centre.

.3 Threaded rods: 6 mm diameter, to support suspended channels.

.8 Connectors:

.1 Watertight, approved for TECK cable.

2.3 CONTROL CABLES

.1 Type LVT: Two (2) soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath: thermoplastic jacket, and armour of closely wound aluminum wire.

.2 Control Cable Type Low Energy: 300 V, soft annealed stranded copper conductors, sized as indicated:

.1 Insulation: Polyethylene.

.2 Overall covering: Type FT-4 PVC or protected by steel interlock armour.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

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

.2 Perform tests with appropriate methods at local conditions and approved by local Authority Having Jurisdiction.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

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

.2 Cable Colour Coding: To Section 26 05 00 - Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

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

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

.6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.7 Numbers to correspond to control shop drawing legend.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring in conduit systems, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF TECK 90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable concealed exposed, securely supported by straps staples hangers.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports, and include product characteristics, performance criteria, physical size, finish, and limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with 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 indoors, in dry location, off ground, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect hangers and supports from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 "U" shape, size 41 x 41 mm, 2.5 mm thick, surface or suspended mounted.

.2 Galvanized-steel support.

.3 Galvanized-steel fasteners.

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 hangers and supports installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

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

.2 Secure equipment to poured concrete, with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings, with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

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

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

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

.7 Beam clamps to secure conduit to exposed steel work.

.8 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.

.9 For surface mounting of two or more conduits use channels at 1.5 m centre-to-centre.

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

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

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

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

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

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 recycling reuse in accordance with Section 01 74 19 - 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 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA).

.1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications, and data sheets, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Provide shop drawings: In accordance with Section 01 33 00 - Submittal Procedures.

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

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

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

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: Welded steel enclosure.

.2 Covers, Surface Mounted: Screw-on flat turned edge covers.

Part 3 Execution

3.1 JUNCTION, PULL BOXES, AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous, but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor, unless otherwise indicated.

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

3.2 IDENTIFICATION

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

.2 Identification Labels: Size 2, indicating voltage and phase, system name or ampacity.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA).

.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: Submit manufacturer's printed product literature, specifications, and data sheets.

.1 Submit cable manufacturing data.

.3 Quality Assurance Submittals:

.1 Test reports: Submit certified test reports.

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

.3 Instructions: Submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

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

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

Part 2 Products

2.1 CONDUITS

.1 Electrical Metallic Tubing (EMT): To CSA C22.2 No. 83, with couplings with expanded ends.

.2 Rigid PVC Conduit: To CSA C22.2 No. 211.2.

.3 Flexible Metal Conduit: To CSA C22.2 No. 56, liquid-tight flexible metal steel aluminum.

.4 Tubings and Conduits: 21 mm minimal diameter, unless specified otherwise.

2.2 CONDUIT FASTENINGS

.1 One-hole galvanized steel straps, to secure surface conduits 53 mm and smaller.

.1 Two-hole steel straps for conduits larger than 53 mm.

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

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

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

2.3 CONDUIT FITTINGS

.1 Fittings: To CAN/CSA C22.2 No. 18, especially manufactured for use with conduit specified.

.1 Coating: Same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set screws are not acceptable.

2.4 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in unfinished areas in mechanical and electrical service rooms.

.3 Surface mount conduits.

.4 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury, except in cast concrete.

.5 Use rigid PVC conduit underground.

.6 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.7 Minimum conduit size for lighting and power circuits: 21 mm.

.8 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than $1/10^{th}$ of its original diameter.

.9 Mechanically bend steel conduit over 21 mm diameter.

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

.11 Install fish cord in empty conduits.

.12 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.13 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel, if required.

.4 Group conduits wherever possible on suspended surface channels.

.5 Do not pass conduits through structural members, except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

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

3.5 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 Insulated Cable Engineers Association, Inc. (ICEA).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for cables, and include product characteristics, performance criteria, physical size, finish, and limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with 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, indoors, off ground, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect cables from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 NON-APPLICABLE

.1 Non-Applicable.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for cable installation, in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables inside ducts.

.3 Install multiple cables in duct simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct sealing compound.

3.3 FIELD QUALITY CONTROL

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

.2 Perform tests using qualified personnel.

.1 Include necessary instruments and equipment. Submit data sheets of testing equipment and latest calibration certificates.

.3 Check phase rotation and identify each phase conductor of each feeder.

.4 Check each feeder for continuity, short-circuits, and grounds.

.1 Ensure resistance to ground of circuits is not less than 50 megohms.

.2 Ensure resistance to ground of all runway circuits is not les than 1 gigaohm measured with a 5 kV insulation tester (Megger).

.5 Pre-acceptance Tests:

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1,000 V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.6 Acceptance Tests:

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.3 High Potential (Hipot) Testing.

.1 Conduct Hipot testing at ICEA recommendations.

.7 Provide Departmental Representative with list of test results showing location at which each test was made, circuit tested and result of each test.

.8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

3.4 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 recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

3.5 PROTECTION

.1 Repair damage to adjacent materials caused by cables installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA).

.1 CSA C22.2 No.29-11, Panelboards and Enclosed Panelboards.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for panelboards, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings:

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

.2 Include on drawings:

.1 Electrical detail of panel, branch breaker type, quantity, ampacity, and enclosure dimension.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for panelboards for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect panelboards from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 PANELBOARDS

.1 Panelboards: To CSA C22.2 No.29 and product of one manufacturer.

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 NEMA 1 panel for indoor installation and NEMA 4X for outdoor installation.

.3 250 and 600 V Panelboards: Busbar short-circuit bracing and breaker short-circuit rating of 14 kA (symetrical) minimum for 600 V panels and 10 kA (symetrical) minimum for 250 V panels, unless indicated otherwise.

.4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.5 Panelboards: Mains, and number and size of branch circuit breakers, as indicated.

.6 Minimum of two (2) flush locks for each panelboard.

.7 Two keys for each panelboard and key panelboards alike.

.8 Copper bus with neutral of same ampere rating of mains.

.9 Mains: Suitable for bolt-on breakers.

.10 Trim with concealed front bolts and hinges.

.11 Trim and Door Finish: Grey baked enamel air dried enamel.

.12 Isolated ground bus, copper.

2.2 BREAKERS

.1 Breakers: To Section 26 28 16.02 - Moulded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards, unless indicated otherwise.

.3 Main Breaker: Separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Lock-on devices for 10 % of 15 to 30 A breakers installed, as indicated. Turn over unused lock-on devices to Departmental Representative.

.5 Unused breakers must not remain in panelboards. Turn over unused breakers to Departmental Representative for storage.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Nameplate for each panelboard, size 4, engraved as indicated.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door.

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 panelboards installation, in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true, and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 00 - Common Work Results for Electrical or as indicated.

.4 Connect loads to circuits.

.5 Connect neutral conductors to common neutral bus with respective neutral identified.

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 recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by panelboards installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 26 24 16.01 - Panelboards Breaker Type.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA).

.1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for circuit breakers, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Include time-current characteristic curves for breakers with ampacity of 100 A and over.

.4 Certificates:

.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit three (3) copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet Standards and Regulations.

.1 Production certificate of origin must be submitted to Departmental Representative for approval.

.2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.

.3 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative. Unless complying with this requirement, Departmental Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the Contract, and to Contractor's expense.

.4 Production certificate of origin must contain:

.1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.

.2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.

.3 Contractor's name and address and person responsible for project.

.4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

.5 Name and address of building where circuit breakers will be installed:

.1 Project title: Schefferville Airport.

.2 End user's reference number: R.096390.001.

.3 List of circuit breakers.

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store circuit breakers in dry location indoors off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect circuit breakers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 BREAKERS GENERAL

.1 fused circuit breakers, Moulded-case circuit breakers, Circuit breakers, accessory high-fault protectors, ground-fault circuit-interrupters: To CSA C22.2 No. 5.

.2 Bolt-on moulded case circuit breaker: Quick- make, quick-break type, for manual and automatic operation, with temperature compensation for 40°C ambient.

.3 Common-trip breakers: With single handle for multi-pole applications.

.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.

.1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

.5 Circuit breakers to have a short-circuit rating not less than the rating of the panel in which they are installed.

2.2 THERMAL MAGNETIC BREAKERS, DESIGN A

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short-circuit protection.

2.3 OPTIONAL FEATURES

.1 Include:

.1 Shunt trip.

.2 Auxiliary switch.

.3 Under-voltage release.

.4 On-off locking device.

.5 Handle mechanism.

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 installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install circuit breakers as indicated.

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 recycling reuse in accordance with Section 01 74 19- 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 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group.

.1 CAN/CSA-C22.2 No.4-04(R2009), Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).

.2 CSA C22.2 No.39-13, Fuseholder Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for disconnect switches - fused and non-fused, and include product characteristics, performance criteria, physical size, finish, and limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with 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 indoors, off ground, in dry location, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect disconnect switches - fused and non-fused from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Fusible, Non-fusible, NEMA 1 enclosure for indoor use, and NEMA 3R for outdoor use, size as indicated.

.2 Provision for padlocking in on-off off switch position by 3 locks.

.3 Mechanically interlocked door to prevent opening when handle in "ON" position.

.4 Fuses: Size as indicated.

.5 Fuseholders: To CSA C22.2 No.39 relocatable and suitable without adaptors, for type and size of fuse indicated.

.6 Quick-make, quick-break action.

.7 "ON-OFF" switch position indication on switch enclosure cover.

.8 Heavy-Duty construction type.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for disconnect switches - fused and non-fused installation, in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install disconnect switches complete with fuses, if applicable.

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 recycling reuse in accordance with Section 01 74 19 - 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 DESCRIPTION OF EXISTING SYSTEM

.1 The Schefferville airport is equipped with a Kohler 125-kW power generator.

.2 Work of the present Section consist of the addition of a remote annunciator unit inside the garage, as indicated.

1.2 RELATED REQUIREMENTS

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications, and data sheets for power generators, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for diesel generator for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

Part 2 Products

2.1 REMOTE WARNING UNIT

.1 Remote annunciator unit from same manufacturer as existing power generator, NEMA 1.

.2 Modbus RTU communication, RS-485 link (twisted and shielded cable with two #16 AWG minimum conductors).

.3 Visual and audible alarm with silence button.

.4 120 V input.

.5 Signal activated by an alarm or a fault of the generator.

Part 3 Execution

3.1 INSTALLATION

.1 Install and connect the warning unit as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 Transport Canada.

.1 Canadian Aviation Regulation Standard 621 (CAR 621) Obstruction Marking and Lighting Standard.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for red obstruction lights and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Test Reports: Submit certified test reports from established third-party testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.1 Testing in accordance with requirements of CAR 621.

.4 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.

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

1.4 CLOSEOUT SUBMITTALS

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

.2 Submit operation and maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 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, indoors, in dry location, and in clean, dry, well-ventilated area, in accordance with manufacturer's recommendations.

.2 Store and protect lights from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 RED OBSTRUCTION LIGHTS

.1 Products to CAR 621.

.2 Single LED light unit, complete with: One (1) aviation red globe; one (1) 8.6W - (120-240 VAC) lamp, certified L-810..

2.2 SUPPORTS

.1 Galvanized steel supports with saddle fastener.

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 instructions prior to red obstruction lighting installation.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.2 INSTALLATION

.1 Install obstruction light units at locations indicated.

.1 Mount single lights on galvanized support, as indicated.

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 recycling, in accordance with Section 01 74 19 - Waste Management and Disposal.

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

END OF SECTION

DIVISION 31

Earthworks

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 43.01 - Installation of Cables in Trenches and in Ducts.

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM).

.1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.5 ASTM D1557-07, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).

.6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 CSA Group (CSA).

.1 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.2 CSA-A23.1/A23.2-19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 DEFINITIONS

.1 Excavation Classes: Two (2) classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock: solid material in excess of 1.00 m^{3}and which cannot be removed by means of heavy-duty mechanical excavating equipment with 0.95 to 1.15 m^{3}bucket. Frozen material not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 mm in any dimension.

.3 Waste Material: Excavated material unsuitable for use in Work or surplus to requirements.

.4 Borrow Material: Material obtained from locations outside area to be graded, required for construction of fill areas or for other portions of Work.

.5 Recycled Fill Material: Material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.6 Unsuitable Materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

.7 Unshrinkable Fill: Very weak mixture of cement, concrete aggregates, and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality Control: In accordance with Section 01 45 00 - Quality Control:

.1 Submit to Departmental Representative written notice when bottom of excavation is reached.

.3 Preconstruction Submittals:

.1 Submit construction equipment list for major equipment to be used in this Section prior to start of Work.

.4 Samples:

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

.2 Inform Departmental Representative at least four (4) weeks prior to beginning Work, of proposed source of fill and unshrinkable fill materials and provide access for sampling.

.3 Submit particle size analysis of proposed materials.

1.5 QUALITY ASSURANCE

.1 Qualification Statement: Submit proof of insurance coverage for professional liability.

.2 Where Departmental Representative is employee of Contractor, submit proof that Work by Departmental Representative is included in Contractor's insurance coverage.

.3 Submit design and supporting data at least two (2) weeks prior to beginning Work.

.4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Quebec.

.5 Keep design and supporting data on site.

.6 Engage services of qualified professional Engineer who is registered or licensed in Province of Quebec, in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.7 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.

.8 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

.2 Divert excess aggregate materials from landfill to local quarry for reuse as directed by Departmental Representative.

1.7 EXISTING CONDITIONS

.1 Examine soil report if Departmental Representative makes it available to Contractor.

.2 Buried services:

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

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

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

.4 Prior to beginning excavation Work, notify applicable Departmental Representative and Authorities Having Jurisdiction to establish location and state of use of buried utilities and structures.

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

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

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

.8 Record location of maintained, re-routed and abandoned underground lines.

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

.3 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey benchmarks, and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Type 1 Fill: 20-0 crushed stone and the following requirements:

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

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117;

.3 Table:

ASTM Sieve		% Passing
31,5	mm	100
20	mm	90-00
14	mm	68-93
5	mm	35-60
1,25	mm	19-38
315	µm	9-7
80	µm	2-7

.2 Type 2 Fill: Class “A” granular soils:

.1 Compactable soils, mainly composed of granular materials, solid and resistant with no plasticity, such as MG-112 sand, gravel, or crushed stone. These soils are free of schist, clay, friable materials, organic, or deleterious and contaminated materials. Soils are not susceptible to frost. Soils do not contain blocks more than 100 mm in diameter.

.3 Type 3 fill: Selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 150 mm, cinders, ashes, sods, refuse, or other deleterious materials.

.4 Unshrinkable Fill: Proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.

.2 Maximum cement content of 25 kg/m^3 with 40% by volume fly ash replacement: To CSA-A3001, Type G.

.3 Minimum strength of 0.07 MPa at 24 h.

.4 Concrete aggregates: To CSA-A23.1/A23.2.

.5 Cement: Type GU.

.6 Slump: 160 to 200 mm.

.5 Before resorting to borrow material, Contractor may use excavated materials if the materials are in accordance with the requirements of these specifications and if approved by the Departmental Representative. Existing soils may not be used as type 2 fill. They may be considered as type 3 fill if they meet the specifications for this type of fill.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

3.2 SITE PREPARATION

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

.2 If required, cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

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

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

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

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

3.4 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as required for Work after area has been cleared of brush, grasses, weeds, and sod, and removed from site.

.2 Strip topsoil to depths as indicated.

.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by Departmental Representative.

.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil off site.

3.5 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

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

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Construct temporary Works to depths, heights and locations as indicated.

.3 During backfill operation:

.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

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

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

.5 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

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

3.7 DEWATERING AND HEAVE PREVENTION

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

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

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

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

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

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or portion of Work completed or under construction.

3.8 EXCAVATION

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

.2 Excavate to lines, grades, elevations, and dimensions, as indicated.

.3 Remove rubble, concrete, and other obstructions encountered during excavation.

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

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

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

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

.7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.8 Restrict vehicle operations directly adjacent to open trenches.

.9 Dispose of surplus and unsuitable excavated material off site.

.10 Do not obstruct flow of surface drainage or natural watercourses.

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

.12 Notify Departmental Representative when bottom of excavation is reached.

.13 Obtain Departmental Representative approval of completed excavation.

.14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.15 Correct unauthorized over-excavation as follows:

.1 Fill under bearing surfaces and footings with fill concrete. Use Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.

.2 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected Standard Proctor maximum dry density.

.16 Hand trim, make firm, and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.9 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D1557 and ASTM D698.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services, as indicated.

.2 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

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

.1 Departmental Representative has inspected and approved installations;

.2 Departmental Representative has inspected and approved of construction below finish grade;

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork;

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

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

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

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 500 mm.

3.12 RESTORATION

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 19 - Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.

.2 Replace topsoil as indicated or on top 300 mm layer.

.3 Reinstate lawns to elevation which existed before excavation.

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

END OF SECTION

DIVISION 32

Exterior Improvements

Part 1 General

1.1 MEASUREMENT AND PAYMENT

.1 The removal of pavement markings will be paid as a lump sum.

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 each type of abrasives used on project.

1.3 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products

2.1 MATERIALS

.1 Abrasives used for removal of paint, oil, grease, rubber deposits: proprietary products specially designed for pavement cleaning, subject to approval by Departmental Representative.

Part 3 Execution

3.1 REMOVING PAVEMENT MARKINGS

.1 In the indicated area, remove rubber tire deposits and paint markings, by milling or other method approved in writing by Departmental Representative.

.2 Exercise care to avoid dislodging of coarse aggregate particles, excessive removal of fines, damage to bituminous binder.

.3 Do not heat pavement surfaces above 120 degrees C, when using heater planning equipment.

3.2 PAVEMENT SURFACE CLEANING

.1 Remove sealing compound which has protruded excessively, where directed by Departmental Representative.

.1 Dispose of removed material in accordance with the requirements of competent authorities.

.2 Remove dust, contaminants, loose and foreign materials, oil and grease, in areas as directed by and by method approved in writing by Departmental Representative.

.3 Use vacuum sweepers supplemented by hand brooming.

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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29.06 - Health and Safety Requirements.

.3 Section 01 74 19 - Waste Management and Disposal.

1.2 MEASUREMENT FOR PAYMENT

.1 Pavement marking will be paid as a lump sum.

1.3 REFERENCES

.1 American Society for Testing and Material (ASTM).

- .1 D562, Standard Test Method for Consistency of Paints Using the Stormer Viscometer.
- .2 D711, Standard Test Method for No-Pick-UP Time of Traffic Paint.
- .3 D1210, Standard Test Method for Fineness of Pigment-Vehicle Systems by Hegman-type Cage.
- .4 D1475, Standard Test Method for Density of Liquid Coating, Inks and Related Products.
- .5 D2244, Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- .6 D2369, Standard Test Method for Volatile Content of Coatings.
- .7 D2371, Standard Test Method for Pigment Content of Solvent-Reducible Paints.
- .8 D4017, Standard Test Method for Water in Paints and Paints Materials by Carl Fisher Method.
- .9 E1347, Standard Test Method for Color and Color Difference Measurement by Tristimulus (Filter) Colorimetry.

.2 Ministère des Transports du Québec (MTQ), Laboratoire des chaussées (LC).

- .1 LC 34-301, Peinture – Détermination du bioxide de titane.
- .2 LC 34-505, Peinture – Détermination de la consistance à 5 °C.
- .3 LC 34-506, Peinture – Détermination du degré de sédimentation par la méthode Patton.
- .4 LC 34-507, Peinture – Détermination de la teneur en chromate de plomb.
- .5 LC 34-508, Peinture – Détermination de la teneur en anhydride phtalique.

.3 Ministère des Transports du Québec (MTQ), normes 10201; Peinture alkyde pour le marquage des routes.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements et 01 35 43 - Environmental Procedures.

.3 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Low-Emitting Materials: Submit listing of paints and coatings to comply with VOC and chemical component limits or restrictions requirements.

1.5 CLOSEOUT SUBMITTALS

.1 Operations and Maintenance Data: Submit information on materials relative to work of this Section for inclusion in Operations and Maintenance Manual and as follows:

.1 Technical data sheet of paint and product utilised.

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials 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 as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Paint as per the following specifications:

Physical and Chemical Characteristic	Testing Method	Requirements Min.	Max.
Consistency (KU)			
at 24°C	ASTM D562	75	85
at 5°C	LC34-505	-	135
Drying (min.)	ASTM D711	7	20
Fineness of grind (µm)	ASTM D1210	80	-
Bleeding	ASTM D969	-	4
White paint		4	-
Yellow paint		6	
Volatile organic contents (COV) (% weight)	ASTM D2369		
White paint		28	32
Yellow paint		26	31
Red paint		-	-
Water content (% weight)	ASTM D4017	1	-
Powdery content (% weight)	ASTM D2371		
White paint		51	55
Yellow paint		52	57
Phthalic anhydride (% weight) of non volatil binder	LC 34-508	32	37
Density (kg/l)	ASTM D1475		
White paint, Yellow paint		Value at approval	
Black pigment		Value at approval	

.1 The paint must satisfy all requirements of the MTQ in matter of pavement markings:

.1 White color: MTQ HOM 8010-201-08 Alkyde 462-742.

.2 Yellow color: MTQ HOM 8010-201-07 Lead Free 462-784.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Pavement Surface: Dry, free from water, frost, ice, dust, oil, grease, and other deleterious materials.

.3 Proceed with Work only after unacceptable conditions have been rectified.

3.2 EQUIPMENT REQUIREMENTS

.1 Paint Applicator: Approved pressure type with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

3.3 APPLICATION

.1 Pavement Markings: Lay out pavement markings as indicated on drawings.

.2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10°C, wind speed is less than 50 km/h and no rain is forecast within next 6 hours.

.3 Apply traffic paint evenly at rate of 3 L/sq.m.

.4 Do not thin paint unless approved by Departmental Representative.

.5 Symbols and letters to dimensions indicated.

.6 Paint Lines: Of uniform colour and density with sharp edges.

.7 Thoroughly clean distributor tank before refilling with paint of different colour.

3.4 TOLERANCE

.1 Paint Markings: Within ± 5 mm of indicated dimensions.

.2 The portion of the taxiway centreline marking that runs parallel to the runway centreline is located:

.1 0.9 m (±0.1 m) from the runway centreline where the width of the runway centreline marking is less than 1.5 m;

.2 1.8 m (±0.1 m) from the runway centreline where the width of the runway centreline marking is 1.5 m or greater.

.3 The taxiway centreline marking is of uniform width of 15 (±5 mm) and continuous in length, except where the taxiway centreline intersects a runway-holding position marking, runway designation marking, taxiway intersection marking, painted sign markings (mandatory instruction or information sign marking), it is interrupted 0.9 m (±0.1 m) before and after the intersecting marking.

3.5 CLEANING

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

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

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

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

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

3.6 PROTECTION OF COMPLETED WORK

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

DIVISION 34

Transportation

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 CSA Group.

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

.2 CSA C22.2 No.179-09 (R2014), Airport Series Lighting Cables.

.3 CSA C22.2 No.180-13, Series Isolating Transformers for Airport Lighting.

.4 CSA C22.2 No.198.2-M1986 - Underground Cable Splicing Kits.

.2 Federal Aviation Administration.

.1 FAA AC 150 5345 26 L823 for Primary/Secondary - Plug/Receptacle Cable Connectors.

.3 Transport Canada/Air Navigation System Requirements Branch.

.1 TP 312-2015, Airfield Standards and Recommended Practices, 5th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide written confirmation of compliance with CSA C22.2 No.180, CSA C22.2 No.179, and CSA C22.2 No.198.2 Standards.

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets, for aeronautical ground lighting (AGL), including product functional and performance characteristics, physical size, finish, and limitations.

.2 Submit evidence of conformation to TP-312 requirements for airfield lighting products.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for airfield lighting for incorporation into manual.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

.2 Supply extra material as follows:

.1 Runway edge lighting, white: Quantity: 10.

.2 Runway edge lighting, white/yellow: Quantity: 4.

.3 Threshold runway lighting, green/red: Quantity: 4.

.4 Taxiway lighting, blue: Quantity: 5.

.5 Apron lighting, yellow: Quantity: 2.

.6 Hazard, obstruction and unserviceable areas marker lights, red: Quantity: 1.

.7 Breakable couplings for runway lights: Quantity: 20.

.8 PAPI lamps: Quantity: 8.

.9 PAPI breakable couplings: Quantity: 3.

.10 Master unit RTIL: Quantity: 1.

.11 Slave unit RTIL: Quantity: 1.

.12 RTIL breakable couplings: Quantity: 2.

.13 Isolating transformer for runway lighting: Quantity: 10.

.14 Isolating transformer for RTIL: Quantity: 2.

.15 Isolating transformer for PAPI: Quantity: 2.

.16 Isolating transformer for signs: Quantity: 2.

.17 PAPI adjustment system: Quantity : 1

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, in clean, dry, and well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect airfield lighting from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.7 OPERATION INSTRUCTION

.1 Provide operation instructions for each main system and each equipment prescribed in relevant Sections of this specification, for operation and maintenance personnel.

.2 Operation instructions include, if applicable:

.1 Cabling diagram, control diagram, control sequence for each main system and each equipment.

.2 Start-up, setup, adjustment, lubrication, operation, and shutdown procedures.

.3 Security measures.

.4 Procedures to be followed in case of breakdown.

.5 Exposed views of equipment identifying name and part numbers.

.6 Methods and periods of maintenance.

.7 Other instructions, as recommended by manufacturer of each system or equipment.

.3 Provide printed or engraved instructions, glass-enclosed or laminated, in an approved manner

.4 Affix instructions at approved locations.

.5 Operating instructions exposed to severe weather are made of durable material or placed in a weathertight envelope.

.6 Ensure that operating instruction will not fade if exposed to sunlight.

Part 2 Products

2.1 GENERAL

.1 Waterproof and weatherproof – withstand exposure to sunlight, oil gasoline, water deicing fluids, and acid/alkaline soils.

.2 Complete electrical and mechanical isolation of the primary to secondary windings and ground for a 5-KV insulation rating.

.3 Operate indefinitely with short- or open circuit loads place on the secondary with the rated current and frequency input applied to the primary winding while immersed in water and or buried in ground.

2.2 SYSTEMS

.1 Systems: To TP 312, 5th Edition.

.2 Description:

.1 Medium-intensity edge lighting on:

.1 Runways 17 and 35.

.2 "Alpha" taxiways.

.3 Runway thresholds.

.4 Aprons.

.2 Runway threshold identification lights (RTIL) at limits of runways 17 and 35.

.3 Wind Direction Indicators (Wind cones) at ends of runways 17 and 35.

.4 PAPI: Precision Approach Path Indicator at ends of runways 17 and 35.

.5 Illuminated airport guidance signs on runways 17 and 35 and taxiway “Alpha”.

.6 Hazard, obstruction, and unserviceable areas marker lights and beacons:

.1 Medium intensity red flashing obstruction light.

.7 Unserviceability/closed lights.

2.3 PRIMARY CABLES

.1 Single conductor concentric stranded soft drawn copper, #8 AWG, 90°C, 5,000 V, type ASLC, combined cross linked polyethylene insulation and jacket: To CSA C22.2 No.179.

.2 Principal length of primary cables, 600 m minimum, to reduce splices and ensure highest level of insulation possible.

2.4 BREAKABLE COUPLING, TYPE 1

.1 For mounting of elevated runway, taxiway, and apron edge lighting fixtures in accordance with international Standards.

.2 Integral breakable coupling of the manufacturer’s design, complying with international standards, for frangibility requirements for elevated LED type edge light fixtures.

2.5 BREAKABLE COUPLING, TYPE 2

.1 Integral breakable coupling of the manufacturer’s design, complying with international standards, for frangibility requirements for PAPIs and RTILs.

2.6 BREAKABLE COUPLING, TYPE 3

.1 Integral breakable coupling of the manufacturer’s design, complying with international standards, for frangibility requirements for illuminated airport guidance signs.

2.7 PRIMARY PLUG RECEPTACLE CONNECTORS

.1 Primary plug and receptacle connector kit, straight type, one male plug and one female plug, for use with isolating transformer or use for separable straight splice of #8 AWG, style 3/10, as per FAA L823, type I, Class B primary cable.

.2 Three (3) layers of vinyl tape, "Super 88" from 3M, to apply on junction.

.3 Contractor to ensure that all employees executing connectors have received appropriate training. A certificate for each electrician will be remitted to Departmental Representative.

.1 Tools: Strapping sealer for connectors to comply with manufacturer's requirements.

.2 Cable stripper: AMP 606700-1.

.3 Submit tool information to Departmental Representative for approval.

.4 Acceptable Products: Amerace (T&B - ABB), 54 Super Kit D4-D4.

2.8 SECONDARY PLUG AND RECEPTACLE CONNECTORS

.1 Two (2) core cable secondary plug connector kit to field assemble secondary extension or terminate fixture lead, using two (2) conductors, 12 AWG, type SOW secondary cable, style 5, to FAA L823, Type II, Class B. Factory assemble cables.

.1 Acceptable Products: Amerace (T&B - ABB), 91 P.

.2 Two (2) core cable secondary receptacle connector kit to field assemble extension or repair transformer lead, using two (2) conductors, 12 AWG, type SOW secondary cable, style 12, to FAA L823, Type II, Class B.

.1 Acceptable Products: Amerace (T&B - ABB), 91 R.

.3 Secondary cable extensions, factory assembled, 1.5 m in lenght: Two (2) conductors, 12 AWG cable with plug connector on one end and receptacle connector on other end, for long secondary runs between transformers and fixtures, style 5, to FAA L823, Type II, Class A.

2.9 AGL SERIES ISOLATING TRANSFORMER

.1 To CSA C22.2 No.180.

.1 Use for 5,000 V, 60 Hz, 6.6 A/6.6 A, AGL Series circuits.

.2 Completed with #8 AWG ground wire from manufacturer.

.3 Compatible with light monitoring systems.

.4 Power rating: In accordance with manufacturer recommendations.

2.10 TRANSFORMER HOUSING

.1 Plastic construction, with tabs to centre and prevent side movement, galvanized metal cover, locking type.

.1 450 mm diameter, 600 mm depth.

2.11 LIGHT UNIT GROUND ANCHOR

.1 Conduit anchor 50.8 mm diameter conduit, 1.5 m long, galvanized steel, threaded one end, with conduit coupling and ground connector.

2.12 GROUND COUNTERPOISE WIRE

.1 Single conductor #8 AWG, soft annealed copper wire.

.1 Solid bare for direct burial as counterpoise for airfield lighting circuits.

.2 Stranded with green TW insulation for placing in duct or conduit, as counterpoise for airfield lighting circuits buried beneath hard surfaces, and for power circuit insulated bonding conductors.

2.13 GROUND ROD

.1 Copper clad steel 19 mm x 3,000 mm long, complete with ground connector.

2.14 OTHER MATERIAL

.1 Secondary Cable:

.1 Two (2) conductors, #12, copper, type SOW, Cab Tire.

.2 Coordinate exterior dimensions of sheath with secondary connector opening.

.2 Three conductors #10, copper, type NMWU.

.3 Cable Ties: Black nylon, appropriate length.

.4 Number identification tags for light units.

.5 Conductor Markers: Galvanized steel tags, 20 mm diameter, with sufficient width for 15 mm high letters, from T&B.

.6 Conduit, Rigid:

.1 Schedule 40 PVC: 53 mm diameter.

.7 Planking, Cable Protection: 50 x 152 mm timber free from checks, shakes, wanes and loose knots, treated with pentachlorophenol wood preservative (not required for buried cables installed in accordance with Electrical Code).

.8 Splicing sleeves.

.9 Tape: PVC type.

.10 Stranded, 6 mm diameter nylon pull cord, with 5 kN resistance.

.11 Splices.

.1 Compression joints per Amerace models for primary cables.

.2 Rubber isolating tape: 130 C Scotch, 50 mm, de 3M.

.3 Vinyl isolating tape: Super 88 Scotch, 38 mm, de 3M.

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 prior to airport lighting installation.

.1 Visually inspect substrate with Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 GENERAL

.1 Install airport lighting underground circuitry in accordance with Canadian Electrical Code, Part I, and CSA C22.1 Standard.

3.3 INSTALLATION OF LIGHT UNIT ANCHORS

.1 Install 50 mm diameter, light unit anchors, at locations indicated. Set plumb and vertical with top of conduit coupling at same elevation as adjacent ground surface:

.1 In common soil:

.1 Drive in conduit.

.2 Screw coupling on.

.2 In solid rock:

.1 Remove surface dirt.

.2 Drill holes 60 cm deep.

.3 Cut conduit to proper length.

.4 Cement grout in position.

.5 Screw coupling on.

.6 Backfill and compact to same level and density as adjacent ground.

3.4 INSTALLATION ISOLATING TRANSFORMERS

.1 Install isolating transformers adjacent to primary cable trench, at locations indicated:

.1 In common ground:

.1 Excavate holes to proper depth.

.2 Install bedding material.

.3 Make connections to:

.1 Primary cable.

.2 Edge light secondary cable.

.3 Ground counterpoise.

.4 Backfill with sand and compact to same level and density as adjacent ground.

.2 In transformer pullpits:

.1 Place suitable transformers in pullpits.

.2 Make connections to:

.1 Primary cable.

.2 Edge light secondary cable.

.3 Ground counterpoise.

.3 Place back cover and lock.

3.5 INSTALLATION OF TRANSFORMER HOUSINGS

.1 Install transformer in transformer housings at locations indicated.

.1 Excavate to size and depth indicated.

.2 Cover bottom of excavation with layer of bedding material.

.3 Place transformer housing so that cover is 100 mm minimum below adjacent ground surface.

.4 Make holes in transformer housing wall suitable for tubing used.

.5 Install incoming and outgoing tubing and/or conduit. Conduits must not protrude more than 50 mm inside of housings. Ream conduit ends to avoid damage to cables.

.6 Backfill with sand washed stone and common backfill material around transformer housing and compact to same level and density as adjacent ground as indicated.

.7 Place cover on housing and lock, turning cover in clockwise rotation. Bolts must not protrude above cover.

.8 Connect the #8 green ground counterpoise wire to cover.

3.6 INSTALLATION OF AIRPORT LIGHTING PRIMARY U/G CABLES

.1 Install airport lighting primary underground cables.

.1 Run cable in conduits.

.2 Make connections using approved connectors as indicated.

.1 Leave 600 mm loop of loose cable at each connection, avoid mechanical tension on connector.

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

.3 In each pull pit and at each lamp, each primary cable shall be marked with the circuit number.

3.7 INSTALLATION OF PRIMARY MOLDED PLUG/RECEPTACLE CONNECTORS

.1 Plug and receptacle connector kit: Plug housing with conductor size wire pin contact and receptacle housing with conductor size wire socket contact. Contact must lock permanently into the housing upon completion on the assembly so that the contact does not dislodge when pulling onto the housing.

3.8 INSTALLATION OF PRIMARY CABLE KIT

.1 Airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 V.

.2 Connections of cable conductors shall be made using crimp connectors with a crimping tool designed to make a complete crimp before the tool can be removed.

3.9 INSTALLATION OF GROUND COUNTERPOISE

.1 Install with runs of series lighting primary cables, in trench, duct and/or tubing at locations as indicated:

.1 Use one (1) conductor, #8 SDBC wire with cables directly buried in trench or in protective tubing:

.1 Place counterpoise wire on top of additional 75 mm layer of bedding material above cables or tubing.

.2 Run counterpoise wire in straight line or in zig-zag pattern as indicated.

.2 Use 1 conductor #8 stranded with TW green insulation, with cables pulled in ducts and/or tubing under pavement.

.3 Use appropriate ground connector and connect counterpoise wire to:

.1 Power supply system common ground.

.2 Each light anchor device.

.3 Each ground rod.

.4 Other ground wires in same trench.

.5 Transformer housing cover.

3.10 INSTALLATION OF SECONDARY CABLES

.1 Install as indicated:

.1 Run cable in conduits.

.2 Make connections using approved connectors as indicated.

.1 In series lighting circuits, connect to isolating transformer secondary outlet.

.2 Leave 600 mm loop of loose cable at connection to transformer.

.3 Run loose cable end above ground to light unit location.

.4 Backfill as indicated and compact to same level and density as adjacent ground.

3.11 FIELD QUALITY CONTROL

.1 Testing requirements:

.1 Assign tests to qualified personnel only.

.2 Provide necessary instruments and equipment to demonstrate that:

.1 Circuits are continuous, free of short-circuits and unspecified grounds.

.2 Circuits are connected according to applicable wiring diagrams.

.3 Circuits perform designated functions in sequence and manner intended.

.4 Resistance to ground of circuits, measured with 5 kV megger is not less than 1,000 meg-ohms for existing cables.

.5 Circuits are operable by:

.1 Energizing and operating each circuit at each brightness not less than 10 times.

.2 Energizing and operating each circuit at full load for continuous period of not less than eight (8) hours.

.3 Redo measurements after.

.2 Provide Departmental Representative with list of test results, indicating:

.1 Location at which test was made.

.2 Circuit number or designator of circuit tested.

.3 Individual test results.

3.12 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.13 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by airfield lighting system installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting.

1.2 REFERENCE STANDARDS

.1 CSA Group.

.1 CSA C22.2 No. 131-14, Type TECK 90 Cable.

.2 CAN/CSA C22.2 No. 38-14, Thermoset-Insulated Wires and Cables.

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

.4 CSA C22.2 No.179-09 (R2014), Airport Series Lighting Cables.

.5 CSA C22.2 No.180-13, Series Isolating Transformers for Airport Lighting.

.6 CSA C22.2 No.198.2-M1986 - Underground Cable Splicing Kits.

.2 Transport Canada.

.1 TP 312-2015, Airfield Standards and Recommended Practices, 5th Edition.

.3 Federal Aviation Administration.

.1 Engineering Brief No.67D, Light Sources Other Than Incandescent and Xenon.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for airfield runway identification lights, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Test Reports: Submit certified test reports from established third-party testing laboratories attesting compliance with specifications for specified performance characteristics and physical properties.

.4 Field Test Reports: Submit test reports relative to work of this Section.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for airfield runway identification lights for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect airfield runway identification lights.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Runway identification lighting (RIL) system to TP 312F, 5th Edition.

.2 RIL system, consisting of: Two (2) flasher heads with integrated control unit.

.3 DEL fixture.

.1 LED master unit, capable of operating in 6.6 A Series operation, from current regulator with three (3) brightness levels.

.1 The master unit starts the flash sequence at a rate of 1 flash every 0.5 sec and verifies that the slave unit is synchronized to the master unit.

.2 LED slave unit, capable of operating in 6.6 A series operation, from current regulator with three (3) brightness levels.

.1 Triggering of flash of the slave unit must be synchronized to the master clock of the master unit.

.3 Mounted on 2 legs.

.4 Equipped with one-level current detection option to automatically adjust brightness levels from controller current.

.5 Beam opening:

.1 15° horizontal.

.2 10° vertical.

.6 High-intensity operation/one level.

.7 Fault detection:

.1 A fault will be generated on loss of supply.

.2 A fault will be generated if more than 25% of LEDs are in fault.

.3 A fault will be generated if the number of misfires per 100 consecutive flashes exceeds a pre-defined value. A value between zero (0) and seven (7) may be chosen using a selector mounted in the master controller.

.8 The locking mechanism cuts out primary power when the master or slave control unit is open.

.4 Cable for connection of flasher heads to auxiliary transformer units to manufacturer's requirements.

.5 Multi-Conductor Cable #14 AWG TECK 90 (-40°C): To CSA C22.2 No.131.

.1 Galvanized steel interlocking armour.

.2 Outer jacket: PVC.

.6 For 6.6A Current Powered Units.

.1 CSA C22.2 No.179, Airport Series Lighting Cables.

.2 CSA C22.2 No.180, Series Isolating Transformers for Airport Lighting.

.3 CSA C22.2 No.198.2, Underground Cable Splicing Kits.

.7 Concrete base as indicated.

.8 Ground rods, in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.9 Ground counterpoise wire, bare copper, #8 AWG, in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.10 Conduit, flexible liquid-tight type.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for airfield runway identification lights installation, in accordance with manufacturer's instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PRIMARY AND SECONDARY FEEDER CABLES FOR RIL

.1 Install primary feeder cable in accordance with Section 26 05 43.01 - Installation of Cables in Trenches and in Ducts and Section 34 43 05 - Common Work Results for Airfield Lighting.

.2 Install 2/C #14 AWG TECK 90, (-40°C) cable between RIL along routes indicated on site drawing.

.1 Bury cable in ground, as indicated on drawings.

.3 Isolating transformer, rating as per manufacturer’s requirements.

3.3 INSTALLATION OF RUNWAY THRESHOLD IDENTIFICATION LIGHTS, FLASHER HEADS

.1 Install RTIL units at runway threshold on new concrete bases.

.2 Mount RIL units on conduit supports, set to proper elevation and fasten rigidly.

.3 Install multi-conductor TECK 90, (-40°C), cable between power supply units to suit manufacturers requirements.

.4 Make electrical connections in accordance with manufacturer's written instructions.

3.4 GROUNDING

.1 Install one ground rod at each RTIL unit location.

.2 Make connections to ground rods and equipment housing, using 1/C #8 AWG soft drawn bare copper wire and suitable ground connectors.

.3 Fasten wire to mounting leg of each unit, using black nylon cable ties.

3.5 ALIGNMENT

.1 Align units to ensure their locations and elevations are as indicated.

.2 Set units in horizontal plane.

.3 Assist in angular setting of units, made by Departmental Representative.

3.6 FIELD QUALITY CONTROL

.1 Perform tests as required in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting and as indicated.

3.7 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by airfield runway identification light installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting.

1.2 REFERENCE STANDARDS

.1 Transport Canada.

.1 TP 312-2015, Aerodrome Standards and Recommended Practices, 5th Edition.

.2 CSA Group.

.1 CSA G40.20/G40.21.

.3 Federal Aviation Administration.

.1 Engineering Brief No. 67D Light Sources Other Than Incandescent and Xenon.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for illuminated guidance signs, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Test Reports: Submit certified test reports from established third-party testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

1.4 CLOSEOUT SUBMITTALS

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

.2 Submit operation and maintenance data for incorporation into manual.

.3 Operation and Maintenance Data: Submit operation and maintenance data for materials relative to work for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 off ground, indoors, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect illuminated airport guidance signs from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 INTERNALLY ILLUMINATED SIGNS

.1 Products to meet TP 312F, 5th Edition.

.2 Airside guidance signs, types and colours, size, quantity, mounting arrangements, as indicated on drawings. Signs to have following characteristics:

.1 Lighting type: DEL;

.2 Minimum height: 600 mm;

.3 Lettering minimum height: 400 mm;

.4 Total mounting height including legs: 1500 mm;

.5 Indications on sign: single sided, as indicated on drawings;

.6 "ON/OFF" switch;

.7 Supply via a three (3) brightness level regulator from 4.8 to 6.6 A;

.8 Transformer to maintain a constant lighting level when connected on a variable intensity circuit;

.9 Detection system to shut off power if more than 25% of LEDs are malfunctioning;

.10 Removable side panel to remove panel front;

.11 Window for observation of LED strip condition from exterior on runway side;

.12 Manufacturers: Eaton Crouse-Hinds; ADB Safegate; AGM.

.3 Mounting assembly frangible couplings with base mounting flanges for mounting on concrete pad, via transition plate.

.4 Secondary lead assembly from sign, external SOW 2/C #12 cab tire and secondary male plug.

2.2 OTHER MATERIALS

.1 Primary cable, single conductor #8 AWG, in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.2 Primary connector in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.3 Secondary cable in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.4 Ground rod in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.5 Ground counterpoise wire, bare copper, #8 AWG in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.6 Breakable coupling in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.7 Isolating power transformer compatible with the dimension of the panel, in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.8 Transformer housing/pullpit in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

.9 Screw anchor, galvanized, 152 mm diameter, single helix, 1.8 m length.

.10 Transition plate, 12 mm flat 6 mm with 38 mm formed lip, CSA G40.20/G40.21 44W steel, hot galvanized after fabrication, supplied c/w 12 mm HDG hardware for sign flange mounting.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for illuminated guidance signs installation in accordance with manufacturer's written instructions.

.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 PRIMARY CABLE

.1 Install airport lighting primary cable in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting as loop circuit for power supply to isolating transformers, as indicated.

.2 Install the counterpoise wire as indicated.

3.3 INSTALLATION OF AIRPORT LIGHTING ISOLATING TRANSFORMERS

.1 Install suitable approved isolating transformer, sized in accordance with manufacturer's written instructions sized as indicated, 6.6A/6.6A, in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting, at locations indicated. Place in transformer housing as indicated.

.2 Number of isolating transformers per sign in accordance with manufacturer's written instructions.

.3 Connect grounding cable to isolating transformer and to ground terminal of panel.

3.4 INSTALLATION OF SIGNS

.1 Mounting of signs, mount with flanges on concrete pad mount, as indicated, ensure that the frangibility point do not protrude more than 50 mm above finished grade.

.2 Ensure sign leg dimensions are not altered to affect or withstand frangibility characteristics of sign.

.3 Properly align and level signs to approval of Departmental Representative.

.4 Install 2C #12 AWG SOW cable and 1C #6 AWG ground with green TW insulation in 32-mm poly tubing from transformer housing to sign location. The cable must be protected by passing under the plate and in a support. The connection will be made at ground level to ensure frangibility. Connect ground wire to ground conductor at isolating transformer and to sign grounding lug.

.5 Install restraining cables to secure signs.

3.5 INSTALLATION OF CONCRETE PAD

.1 Install at locations, as indicated.

.2 Cover bottom of excavation with layer of crushed stone, as indicated.

.3 Install tubing or conduit for secondary feeder cables as indicated.

.4 Obtain authorization of Departmental Representative before starting erection of sign fixtures.

3.6 CONTROL OF SIGNS

.1 Ensure lighted signs are energized from respective runway or taxiway light circuits, as indicated.

3.7 FIELD QUALITY CONTROL

.1 Perform tests as required in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

3.8 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by illuminated guidance sign installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting.

1.2 REFERENCE STANDARDS

.1 Transport Canada.

.1 TP 312- 2015, Aerodrome Standards and Recommended Practices, 5th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for airfield elevated edge lighting, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Test Reports: Submit certified test reports from established third-party testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for airfield elevated edge lighting for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect airfield elevated edge lighting units from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 ELEVATED TAXIWAY EDGE LIGHT - SERIES CIRCUIT

.1 Light unit - apron taxiway edge: To TP 312, 5th Edition.

- .1 Up to LED light 14 VA, 6.6 A, as indicated.
- .2 Glass globe symmetrical photometric distribution, blue or yellow, as indicated.
- .3 External SOW cord assembly with male plug, with two #12 AWG conductors, Type 91 P of Amerace.
- .4 Breakable coupling.
- .5 Suitable for mounting 50.8 mm diameter threaded anchor stake coupling.
- .6 Isolating transformer 6.6 A/6.6 A - capacity in accordance with manufacturer's recommendations.
- .7 Manufacturers: Multi-Electric; OCEM; Hella; ADB.

2.2 MEDIUM INTENSITY ELEVATED LIGHT - SERIES CIRCUIT

.1 Light unit - runway edge: To TP 312, 5th Edition.

- .1 Up to 6.6 A LED light, 20 VA, as indicated.
- .2 Glass globe, white, white/yellow, as indicated.
- .3 External SOW cord assembly with male plug, with two #12 AWG conductors, type 91 P of Amerace.
- .4 Breakable coupling.
- .5 Suitable for mounting 50.8 mm diameter threaded anchor stake coupling.
- .6 Isolating transformer 6.6A/6.6A - capacity in accordance with manufacturer's recommendations.
- .7 Manufacturers: Multi-Electric; OCEM; Hella; ADB

.2 Light unit, runway threshold/end: To TP 312, 5th Edition.

- .1 Up to 20 VA, 6.6 A, LED light, as indicated.
- .2 Glass globe, red/green.
- .3 External SOW cord assembly, with two #12 AWG conductors and one green with plug, type 91 P of Amerace.
- .4 Breakable coupling.
- .5 Suitable for mounting 50.8 mm diameter threaded anchor stake coupling.
- .6 Isolating transformer 6.6 A/6.6 A - capacity in accordance with manufacturer's recommendations.
- .7 Manufacturers: Multi-Electric; OCEM; Hella; ADB.

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 prior to airfield elevated edge lighting installation.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 LIGHT UNIT INSTALLATION

.1 Install at locations indicated or as directed by Departmental Representative.

.2 Install in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting and as indicated hereafter:

.1 On tubular anchors (conduit).

.2 Total height of lighting must not exceed 350 mm above ground.

.3 Height of frangibility point must not be higher than 50 mm above ground.

.3 Assemble in accordance with manufacturer's written installation instructions.

.1 Connect isolating transformer secondary lead to light unit cord assembly by means of disconnecting plug and receptacle.

.2 Do not tape this connection.

.4 Level in accordance with manufacturer's written instructions.

.5 Install coloured filters, as indicated.

.6 Install globes, as indicated.

.7 Install number identification tag.

3.3 FIELD QUALITY CONTROL

.1 Perform field tests in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

3.4 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by airfield elevated edge lighting installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting.

1.2 REFERENCE STANDARDS

.1 Transport Canada/Air Navigation System Requirements Branch.

.1 Advisory Circular (AC) No. 302-009-2010, Precision Approach Path Indicator Harmonization with Instrument Landing System.

.2 Advisory Circular (AC) No. 300-006-2012, Precision Approach Path Indicator Maintenance and Inspection (PAPI).

.3 TP 312-2015, Aerodrome Standards and Recommended Practices, 5th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for Airfield Precision-Approach Path Indicator Equipment, including product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings:

.1 Submit drawings.

.4 Certifications: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Test Reports: Submit certified test reports from established third-party testing laboratories attesting compliance with specifications for specified performance characteristics and physical properties.

.6 Manufacturer's Field Reports: Submit manufacturer's written reports within three (3) days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for airfield precision-approach path indicator equipment for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials, indoors, off ground, in clean, dry, well-ventilated area, and in accordance with manufacturer's recommendations.

.2 Store and protect airfield precision-approach path indicator equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 PAPI SYSTEM

.1 PAPI system consists of following components:

.1 Four (4) identical light units;

.2 2-lamp quartz unit;

.3 Aiming and calibration equipment.

.2 Style:

.1 Style B - Current powered (series circuit) systems.

.3 Class:

.1 Class I - Systems which operate down to -35°C.

.4 Options:

.1 Lamp bypass devices, as specified.

2.2 PAPI LIGHT UNITS

.1 Products: To TP 312F, 5th Edition.

.2 PAPI light units, 2-lamp quartz unit, three (3) mounting legs.

.3 Photoelectric Requirements: Each light unit to have minimum of two (2) lamps and provide beam of light split horizontally, to produce white light in top sector and red light in bottom sector.

.1 Colour transition from red to white in the vertical plane appears to an observer, at a distance not less than 300 m, to occur within a vertical angle of not more than three (3) minutes of arc at the beam centre, increasing not more than five (5) minutes of arc at the beam edges of ±15 degrees horizontal.

.2 Line drawn through centre of transition band at +10°, 0°, and B -10°, straight to within three (3) minutes of arc.

.3 Light colours: Aviation white and aviation red to TP 312F.

.4 Light transmitting covers.

.5 Quartz halogen lamps: Rated life of 1,000 hours in this application, design to achieve full intensity within five (5) seconds after cold start.

.4 Light Unit Construction: Design each light unit to accommodate dynamic loading due to wind, or static loading due to snow, and not cause displacement of light pattern.

.1 Provide light unit with overhang or other means to inhibit rain or snow from reaching optical lens.

.2 Provide light units with heated front lens or other means in order to remove any accumulated frost or condensation from the front glass of the optical assembly.

.5 Mounting Provisions: Three (3) adjustable mounting legs, designed to permit leveling where one side of unit is installed up to 25 mm higher or lower than opposite side.

.1 Legs: Mounting and adjusting hardware, rigid galvanized steel conduit, frangible couplings, and flanges suitable for mounting on concrete pad.

.2 Adjusting hardware: Designed to prevent displacement of optical system due to vibration.

.3 Alternate mounting systems may be proposed where equivalent rigidity, frangibility, and adjustability are provided.

.6 Aiming: Provide light units with integral adjustments to permit accurate vertical positioning of centre of light beam at any elevation, between 2° and 6°.

.1 Centre of light beam is defined as transition band between red and white light indicating vertical angle of light beam centre within accuracy of +three (3) minutes of arc.

.2 Aiming device: To indicate minutes of arc and have at least one division every ten (10) minutes, or units may be factory calibrated to fixed vertical angle where means are provided to permit field installation at desired angle within accuracy of +three (3) minutes.

.3 Provide procedure to enable ground verification of aiming angles in the field.

.7 Leads: Introduce wiring into light units through leads fitted with factory-molded plugs.

.1 Length: Adequate to extend from unit through flexible conduit to frangible coupling at ground level.

.2 Provide strain relief to prevent pulling on lead from being transmitted to its connections in light unit.

.8 Shorting Device: Include lamp bypass device, which provides short-circuit around burned-out lamp if required by manufacturer.

2.3 FINISHES

.1 Finish exterior of units to be of international orange.

Part 3 Execution

3.1 PREPARATION

.1 Install new concrete mounting pads for PAPI units, as indicated.

.2 Construct reinforced concrete pad under each mounting leg for attachment of mounting flanges.

.3 Mount light boxes to foundation with frangible connections.

.4 Style B Systems: Install transformer housing below grade to provide convenient protected location for isolation transformer.

3.2 INSTALLATION OF ELECTRICAL COMPONENTS

.1 Manufacturer's Instructions: Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and data sheets.

.2 Installation to applicable Sections of Canadian Electrical Code Part I, CSA C22.1.

.3 Install electrical connections to PAPI unit using plugs and receptacles to allow unit to pull free if struck by aircraft.

.4 House extra control circuitry enclosed and protected from environment.

.5 Install underground cable to Section 34 43 05 - Common Work Results for Airfield Lighting.

.6 Use splices or appropriately rated plugs for underground connections.

3.3 INSTALLATION OF PAPI UNITS

.1 Locate PAPI units as indicated.

.2 Install on concrete base with flanges as indicated.

.3 Cut legs to length required to provide indicated PAPI height above ground.

.4 Assemble units per manufacturer's instructions.

.5 Install secondary cables 2C #12 SOW flexible liquid-tight conduit and wiring from isolating transformers, as indicated.

.6 Install ground rods, as indicated.

.1 Make connections to ground rods and equipment housings using 1/C #8 SDBC wire and suitable ground connections.

.7 Level units and adjust in accordance with manufacturer's written instructions and to angular settings as indicated as directed by the Departmental Representative.

.1 Align each PAPI unit so aperture is horizontal and at same elevation as other units.

.2 Use equipment supplied or specified by PAPI manufacturer for levelling and angular adjustments.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Manufacturer to submit his recommendations in regards of usage of product(s).

.2 Verify installation to tolerances specified in TP 312F.

.3 Verify PAPI setting angles independent of the clinometer by means of a ground survey method as described in the manufacturer's instruction manual.

.4 Provide commissioning of PAPI APAPI in accordance to Advisory Circular (AC) No. 300-006-2012. Contractor to obtain Departmental Representative’s approval of calibration and testing procedure of PAPIs.

3.5 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

.3 Waste Management: Separate waste materials for recycling in accordance with Section 01 74 19 - 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 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting.

1.2 REFERENCE STANDARDS

.1 Transport Canada.

.1 TP 312-2015, Airfield Standards and Recommended Practices, 5th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for airfield wind cones, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Samples:

.1 Submit for review and acceptance duplicate 150 x 150 mm minimum samples of wind direction indicator fabric.

.4 Field Test Reports: Submit test reports relative to work of this Section.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for airfield wind cones for incorporation into manual.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, in accordance with manufacturer's recommendations, and in clean, dry, well-ventilated area.

.2 Store and protect wind cone from tears.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Wind direction indicator products in accordance with TP 312, 5th Edition.

2.2 WIND DIRECTION INDICATOR FABRIC

.1 Wind direction indicator fabric as indicated, 927 mm diameter, 3,750 mm length, international aviation orange and white colour coding.

.1 Nylon fabric: Rot, mildew, and water-resistant.

2.3 WIND DIRECTION INDICATOR

.1 Wind direction indicator fabric, with hinged aluminum mast.

2.4 ISOLATING TRANSFORMER

.1 Compatible with installed system and supplied by a three (3) brightness circuit 4.8 A to 6.6 A.

.2 6.6 A/6.6 A, 200-W isolating transformer, with secondary grounding device.

.3 A supply box to maintain constant illumination when connected to a variable brightness runway or taxiway circuit.

2.5 INTERRUPTOR

.1 Interruptor: 15 A, single-pole, rainproof, in CSA type 3R enclosure.

2.6 CONCRETE FOOTING

.1 Concrete footing as indicated.

2.7 GROUND WIRE

.1 Bare stranded copper, #3/0 AWG.

2.8 LAMPS

.1 Unit shall be backlit with an internal lamp having the following characteristics:

.1 LED, 2.8 A to 6.6 A, current powered.

.2 50,000 service life.

2.9 GROUND ROD

.1 19 mm diameter x 3,000 mm long, with ground connector.

2.10 ANCHOR BOLTS

.1 Frangible anchor bolts or fuse bolts for mounting when the wind direction indicator is located within the designated runway strip.

.2 Standard anchor bolts when the wind direction indicator is located outside the designated runway strip.

2.11 TUBING

.1 Polyethylene, 53 mm diameter, 34.5 kPa.

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 prior to wind direction indicator equipment installation.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION OF WIND DIRECTION INDICATOR

.1 Install concrete base at location indicated. Ensure correct installation of bolts frangible mounting bolts/fuse bolts as per manufacturer’s directions to ensure a maximum 50 mm projection of the yield point above grade.

.2 Mount hinged steel aluminum mast, complete with wind cone frame and accessories, as indicated.

.3 Install primary feeder cable to Sections 26 05 43.01 - Installation of Cables in Trenches and in Ducts, along route indicated.

.4 Run cable in existing duct.

.5 Connect to transformer primary.

.6 Install two (2) #12 conductors, type SOW, cab tire cable, connect to transformer secondary lug and to wind cone lighting fixture.

.7 Make adjustment.

3.3 FIELD QUALITY CONTROL

.1 Perform field tests in accordance with Section 34 43 05 - Common Work Results for Airfield Lighting.

3.4 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by airfield wind direction indicator installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting.

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 airport lighting control system, including product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.

.2 Indicate configuration and dimensions of individual control units.

.3 Indicate control panel construction, dimensions, materials and finishes.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for airport lighting control system for incorporation into manual.

.1 Indicate: description of relay interface panels.

.2 For control panels: Indicate manufacturer's name, type, year, number of units, and capacity.

.3 Supply one (1) hard copy and one (1) soft copy of wiring diagram with each panel. Wiring diagram to show colour code or number identification of each wire and proper connections.

.4 Supply component parts list and installation instructions with each control panel along with enough drawings or illustrations to indicate method of installation.

1.4 QUALITY ASSURANCE

.1 Ensure products are from one manufacturer.

1.5 AIRFIELD LIGTIHNG CONTROL SYSTEM DESCRIPTION

.1 The airfield lighing control system must include the following components:

.1 Roof-mounted antenna;

.2 Type K ARCAL radio receptor;

.3 Cavity filter as per ARCAL frequency receiver;

.4 Relay interface panel.

.2 Description of System Operation:

.1 The ARCAL system is activated upon receiving, via the roof antenna, a series of energy pulses (3, 5, or 7) at the programmed radio frequency within a five-second period from an aircraft.

.2 Exit relays are configured for incremental operation: At the third pulse, the first relay closes, at the fifth pulse, the second relay closes, at the seventh pulse, the third relay closes.

.3 The relay interface receives signals from the ARCAL receptor and activates relays to set the lighting intensity of each constant current regulator at the required intensity.

.1 The relay interface panel must include a command relay for each intensity of each constant current regulator:

.1 One 3 steps constant current regulator for the runway lighting circuit. 3 pulses = intensity 1 (10%), 5 pulses = intensity 2 (30%), 7 pulses = intensity 3 (100%);

.2 One 3 steps constant current regulator for the Runway threshold identification lights (RTIL) circuit. 3 pulses = stop, 5 impulses = stop, 7 pulses = intensity 3 (100%);

.3 One 5 steps constant current regulator for PAPI circuit:

.1 The first step must be use for heating the PAPI units.

.1 A switch must be installed on the face of the airfield lighting control panel to activate of deactivate the Heating function. Indicate « Été » and « Hiver » on the switch.

.2 If activated, the first step (regulator adjusted to 2A) will be used to heat the PAPI units.

.3 Upon reception of an ARCAL signal, the relay interface will deactivate temporarily the heating function and command the regulator to the required intensity.

.2 Second step is unused.

.3 Step 3 (3 pulses), 4 (5 pulses) and 5 (7 pulses) will command the lighting intensity of the PAPI circuit. Step 3 must be adjusted to 4,8 A.

.4 One 3 steps spare constant current regulator.

.2 The relay interface panel must include a relay to be interfaced with the existing rotary beacon contactor:

.1 This relay must be interconnected with the contactor so that a set of 3, 5, and 7 impulsions received by the ARCAL system will activate the rotary beacon.

.3 A remote « OFF – ON » 2 positions selector, identified « déneigement à distance »must be interfaced with the relay interface panel. This selector will allow the airfield lighting circuits to be manually activated at medium intensity (2, 30%).

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, and in accordance with manufacturer's recommendations, in clean, dry, well-ventilated area.

.2 Store and protect airfield lighting control equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.7 MATERIAL IDENTIFICATION

.1 No "P-touch" identification will be accepted.

.2 Provide Lamicoid identification plates for all new components to be installed in FEC.

Part 2 Products

2.1 ARCAL RECEIVER

.1 Produced according to the requirements of TP-312, 5th Edition.

.2 Complying with L-854 AC 150/5345-16, Edition in force, ETL certified.

.3 Input Voltage: 120 VAC, ± 10%, 60 Hz.

.4 Contacts of output relays are calibrated at 3A.

.5 Operation Temperature: -55 to + 55 °C.

.6 Operation Frequencies: 118.0 at 136.0 MHz VHF, programmable by user. Control electronics allow user to easily change the programmed frequency.

.1 The basic programmed frequency is channel 122.2 MHz.

.2 The frequency of the programmed channel shall be coordinated with the airport representative.

.7 Antenna: Remote.

.8 Configured in ARCAL type K units via DIP switch.

.9 Must have a memory to maintain the intensity selected by the pilot during a momentary power failure, ensuring a return to operating conditions prior to the failure.

2.2 ARCAL CAVITY FILTER

.1 Aviation type VHF cavity filter, with the following characteristics:

.1 Aluminum with internal copper and brass coaxial conductor;

.2 Silver and chromate coating limiting corrosion and improving filter performance;

.3 Temperature compensated for very low frequency variation;

.4 Frequency range: 108 to 138 MHz:

.1 Cavity frequency must be calibrated at the factory;

.2 Cavity frequency must be coordinated with the ARCAL receptor's operating frequency;

.3 Provide a performance certificate with the new cavity filter.

.5 Impedance: 50 ohms;

.6 Average power: 350 W;

.7 Operation temperature: -40 to +60 °C.

.2 Recognized Manufacturer: Sinclair, same model as existing filter.

2.3 COAXIAL CABLE FOR ARCAL RECEIVER

.1 "Héliax" type coaxial cable at low lost.

.2 Frequency Range: Must match the frequency range of the ARCAL receiver.

.3 Connectors suitable for connection to ARCAL receiver, ARCAL filter, and antenna.

2.4 ROOF-MOUNTED REMOTE ANTENNA FOR ARCAL RECEIVER

.1 Aviation type VHF antenna, omnidirectional.

.2 Frequency Range: Must match the frequency range of the ARCAL receiver.

.3 Model and recognized manufacturer: Same as existing model, Sinclair "Hevi Duty" type.

2.5 RELAY INTERFACE PANELS

.1 Control panels consisting of switches devices/changeover switches and relays, in NEMA 1 Enclosure, as indicated, to control airfield system as described above.

.1 Position switches/selectors must be equipped with a LED pilot light;

.2 The relay interface panel must be equipped with LED pilot lights to indicate:

.1 Relay interface is live.

.2 The different state of operation «Manual, Automatic, Local, Distant », as per configuration.

.3 Wall-mounted.

.2 Control panel to select control source for airfield lighting control equipment.

.1 Airfield lighting can be activated from a 2-position selector installed outside the electrical room. This selector is identified as "Déneigement".

.3 Relay panel to interface control of existing rotary aeronautical beacon, as indicated.

.4 Supply: 120 V.

2.6 ACCESSOIRES

.1 Screw terminal type connector blocks designed for rated current and voltage of not less than 10 A and 120 V, respectively.

.2 Spare parts:

.1 Provide a set of spare fuses identical to those in the relay interface panel.

.2 Provide a spare relay for each type of relays in the relay interface panel.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrates and surfaces to receive airfield lighting control equipment previously installed under other Sections or Contracts are acceptable for airport lighting control system installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Manufacturer's Instructions: Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and data sheets.

.2 The Contractor shall supply all equipment, cabling, conduits, enclosures, supports, anchors, and accessories required for a functional and complete installation of the airfield lighting control system.

3.3 INSTALLATION OF RELAY INTERFACE PANEL

.1 Install control panel in FEC, as indicated.

.2 Make wiring connections as indicated.

.3 Identify terminal block points or wires with permanent markers, as indicated.

.4 Adjust the intensity of the regulator according to levels indicated in the airfield control.

3.4 INSTALLATION OF REMOTE-CONTROL CABLES

.1 Run cable and make connections as indicated.

.2 For "Heliax" coaxial cables, supply and install the required connectors.

3.5 ADJUSTING

.1 Adjust system to operate as designed.

3.6 FIELD QUALITY CONTROL

.1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its product.

.2 Manufacturer must submit recommendations as to the use of product(s).

3.7 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by airfield lighting control system installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 34 43 05 - Common Work Results for Airfield Lighting

1.2 REFERENCE STANDARDS

.1 International Electrotechnical Commission (IEC).

.1 IEC 61822-09, Electrical Installations for Lighting and Beaconing of Aerodromes - Constant Current Regulators

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, and data sheets for regulator assembly, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings:

.1 Submit installation drawings and wiring diagrams.

.4 Field Test Reports: Submit test reports relative to work of this Section.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for regulator assembly for incorporation into manual.

.3 Wiring Diagrams: Submit complete control wiring diagram schematics of regulator assembly installation including for incorporation into operations and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, and in accordance with manufacturer's recommendations, in clean, dry, well-ventilated area.

.2 Store and protect regulator assembly from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 REGULATOR ASSEMBLY

.1 Indoor metal-clad regulator assembly, composed of control compartment, 120/240 V distribution, input power, HV distribution circuit selector, constant current regulator 7.5 kW or 4 kW as indicated; input voltage 208 V, 60 Hz, 600 A busbar, interrupting capacity 14,000 A, and continuous ground bus throughout assembly as indicated.

.2 CSA approved and labeled.

2.2 CONSTANT CURRENT REGULATORS

.1 Products to meet FAA L828/829.

.2 Indoor air cooled Constant Current Regulator (CCR), ferroresonant type, with control relay for remote 120 VAC operation and dry-type copper wound input/output transformer.

.3 7.5 or 4k W rated, as indicated.

.4 Ferro resonant Silicon-Controlled Rectifier (SCR) type, 6.6 A output, size as indicated.

.5 Three (3) or five (5) intensity levels, as indicated.

.6 Series circuit cut-out at S1 output with terminals to test insulation resistance of output cables (Megger).

.7 Regulators shall maintain power in the event of a ground in the circuit.

.8 Integrated door safety interlock switch to de-energize the unit before accessing the high voltage section and prevent energizing the unit while the door is open.

.9 Regulators shall have operator interface which has display and control features as follows:

.1 CCR "Off/On";

.2 Power supply OK;

.3 Open circuit alarm;

.4 Overcurrent alarm;

.5 Status of CCR (OK, Failure);

.6 Output current and intensity level;

.7 Additional warning alarm output relays;

.8 Input voltage, current power measurement;

.9 Output voltage and power measurement.

.10 Sizes: 800 mm W x 1,200 mm H x 800 mm D.

2.3 SPARE PARTS

.1 Provide the following spare parts:

.1 Three (3) set of fuses of each type;

.2 One (1) Digital Control and Monitoring Unit (DCMU) controller;

.3 One (1) digital display module c/w cable;

.4 One (1) control transformer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for regulator assembly installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install as indicated and as directed by Departmental Representative.

.2 Make necessary electrical connections, of external wiring, as indicated.

.3 Wire external control wiring to terminal blocks within control cubicle, as indicated.

.4 Ensure sufficient extra length on each control lead to allow for future changes.

.5 Ensure bundled control lead are trained and laced.

3.3 WIRE IDENTIFICATION

.1 Install permanent wire markers for external control leads at termination points in control cubicle.

.2 Use wire markings as indicated.

3.4 CARDS

.1 Cards: Where equipment is furnished with cardholders, provide and insert cards with printed designations, and insert into cardholders.

3.5 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

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

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

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by regulator assembly installation.

END OF SECTION