Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

**RETURN BIDS TO:**
**RETOURNER LES SOUMISSIONS À:**
**Travaux publics et Services gouvernementaux Canada**
**Place Bonaventure, portail Sud-Est**
**800, rue de La Gauchetière Ouest**
**7 ième étage**
**Montréal**
**Québec**
**H5A 1L6**
**FAX pour soumissions: (514) 496-3822**

# INVITATION TO TENDER
# APPEL D'OFFRES

**Tender To: Public Works and Government Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Soumission aux: Travaux Publics et Services Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici et sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

| | |
|---|---|
| **Title - Sujet**<br>Eclairage cours extérieures Ste-Ann | |
| **Solicitation No. - N° de l'invitation**<br>21301-144397/A | **Date**<br>2013-11-04 |
| **Client Reference No. - N° de référence du client**<br>21301-14-4397 | **GETS Ref. No. - N° de réf. de SEAG**<br>PW-$MTC-480-12474 |
| **File No. - N° de dossier**<br>MTC-3-36293 (480) | **CCC No./N° CCC - FMS No./N° VME** |
| **Solicitation Closes - L'invitation prend fin**<br>**at - à 02:00 PM**<br>**on - le 2013-11-28** | **Time Zone**<br>**Fuseau horaire**<br>Heure Normale du l'Est HNE |
| **F.O.B. - F.A.B.**<br>**Plant-Usine:** ☐ **Destination:** ☑ **Other-Autre:** ☐ | |
| **Address Enquiries to: - Adresser toutes questions à:**<br>Belisle (mtc480), France | **Buyer Id - Id de l'acheteur**<br>mtc480 |
| **Telephone No. - N° de téléphone**<br>(514) 496-3881 ( ) | **FAX No. - N° de FAX**<br>(514) 496-3822 |
| **Destination - of Goods, Services, and Construction:**<br>**Destination - des biens, services et construction:**<br>SERVICE CORRECTIONNEL DU CANADA<br>Centre Régional de Réception<br>246 Montée Gagnon SADP<br>Ste-Anne-des-Plaine<br>Québec<br>J0N 1H0<br>Canada | |

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**
**Raison sociale et adresse du fournisseur/de l'entrepreneur**

| | |
|---|---|
| **Delivery Required - Livraison exigée**<br>. | **Delivery Offered - Livraison proposée** |
| **Vendor/Firm Name and Address**<br>**Raison sociale et adresse du fournisseur/de l'entrepreneur**<br><br>**Telephone No. - N° de téléphone**<br>**Facsimile No. - N° de télécopieur** | |
| **Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)**<br>**Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)**<br><br>**Signature** **Date** | |

**Issuing Office - Bureau de distribution**
Travaux publics et Services gouvernementaux Canada
Place Bonaventure, portail Sud-Est
800, rue de La Gauchetière Ouest
7 ième étage
Montréal
Québec
H5A 1L6

Canada

# INVITATION TO TENDER

## IMPORTANT NOTICE TO BIDDERS

### CLAUSES REFERRED TO BY NUMBER (I.E. R2890D) CAN BE FOUND AT THE FOLLOWING WEB SITE

https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R

### LIMITATION OF LIABILITY

PWGSC is limiting the Contractor's first party liability for work in Low Rise, High Rise and Heritage Buildings. See changes to GC1.6 "Indemnification by the Contractor" of R2810D in the Supplementary Conditions.

# TABLE OF CONTENTS

# SPECIAL INSTRUCTIONS TO BIDDERS (SI)

## SI01 CODE OF CONDUCT AND CERTIFICATIONS - RELATED DOCUMENTATION

By submitting a bid, the Bidder certifies that the Bidder and its affiliates are in compliance with the provisions as stated in Section 01 Code of Conduct and Certifications - Bid of Standard Instructions R2710T (2013-06-27). The related documentation therein required will assist Canada in confirming that the certifications are true.

## SI02 BID DOCUMENTS

1. The following are the bid documents:

   a. Invitation to Tender - Page 1;
   b. Special Instructions to Bidders;
   c. General Instructions to Bidders R2710T (2013-06-27);
   d. Clauses & Conditions identified in “Contract Documents”;
   e. Drawings and Specifications;
   f. Bid and Acceptance Form and related Appendice(s); and
   g. Any amendment issued prior to solicitation closing.

   Submission of a bid constitutes acknowledgement that the Bidder has read and agrees to be bound by these documents.

2. General Instructions to Bidders is incorporated by reference and is set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site:

https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual

## SI03 ENQUIRIES DURING THE SOLICITATION PERIOD

1. Enquiries regarding this bid must be submitted in writing to the Contracting Officer named on the Invitation to Tender - Page 1 as early as possible within the solicitation period. Except for the approval of alternative materials as described in GI15 of R2710T “General Instructions to Bidders“, enquiries should be received no later than (7) calendar days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may not result in an answer being provided.

2. To ensure consistency and quality of the information provided to Bidders, the Contracting Officer shall examine the content of the enquiry and shall decide whether or not to issue an amendment.

3. All enquiries and other communications related to this bid sent throughout the solicitation period are to be directed ONLY to the Contracting Officer named on the Invitation to Tender - Page 1. Failure to comply with this requirement may result in the bid being declared non-responsive.

**SI04 MANDATORY SITE VISIT**

There will be a site visit on **November 19th at 1:30**. Interested bidders are to meet at Regional Reception Center, 246 Montee Gagnon, Ste-Anne-des-Plaines, Québec, J0N 1H0.

The site visit for this project is MANDATORY. The representative of the bidder will be required to sign the Site Visit Attendance Sheet at the site visit. Bids submitted by Bidders who have not signed the attendance sheet will not be accepted.

**Security Requirement**

Contractor personnel shall submit to a local verification of identity or information by Correctional Service Canada (CSC) prior to admittance to the facility/site. Correctional Service Canada reserves the right to deny access to any facility/site part thereof of any Contractor personnel, at any time.

All Contractor personnel or sub-contractors that must have access to CSC facilities must complete the form CSC-SCC 1279. CSC reserves the right to deny access to any employees that doesn't meet CSC security minimum standards. Canada will not pay any compensation to the Contractor for employees that have been denied access. (see the attached form).

**Send form by email: pierre-yves.chaumont@csc-scc.gc.ca or by fax at: 450-478-5969 at least three (3) working days before the Bidders' site visit.**

Contractor personnel will be escorted in specific areas of the facility / site as and where required by Correctional Service Canada personnel or those authorized by CSC to do so on its behalf.

**SI05 REVISION OF BID**

A bid may be revised by letter or facsimile in accordance with GI10 of R2710T "General Instructions to Bidders". The facsimile number for receipt of revisions is (514) 496-3822.

**SI06 BID RESULTS**

1. A public bid opening will be held in the office designated on the Front Page "Invitation to Tender" for the receipt of bids shortly after the time set for solicitation closing.

2. Following solicitation closing, bid results may be obtained by calling at (514) 496-3388.

**SI07 INSUFFICIENT FUNDING**

In the event that the lowest compliant bid exceeds the amount of funding allocated for the Work, Canada in its sole discretion may

a. cancel the solicitation; or

b. obtain additional funding and award the Contract to the Bidder submitting the lowest compliant bid; and/or

c. negotiate a reduction in the bid price and/or scope of work of not more than 15% with the Bidder submitting the lowest compliant bid. Should an agreement satisfactory to Canada not be reached, Canada shall exercise option (a) or (b).

## SI08 BID VALIDITY PERIOD

1. Canada reserves the right to seek an extension to the bid validity period prescribed in BA04 of the Bid and Acceptance Form. Upon notification in writing from Canada, Bidders shall have the option to either accept or reject the proposed extension.

2. If the extension referred to in paragraph 1. of SI07 is accepted, in writing, by all those who submitted bids, then Canada shall continue immediately with the evaluation of the bids and its approvals processes.

3. If the extension referred to in paragraph 1. of SI07 is not accepted in writing by all those who submitted bids then Canada shall, at its sole discretion, either

   a. continue to evaluate the bids of those who have accepted the proposed extension and seek the necessary approvals; or

   b. cancel the invitation to tender.

4. The provisions expressed herein do not in any manner limit Canada's rights in law or under GI11 of R2710T "General Instructions to Bidders ".

## SI09 CONSTRUCTION DOCUMENTS

The successful Contractor will be provided with one paper copy of the sealed and signed drawings, the specifications and the amendments upon acceptance of the offer. Additional copies, up to a maximum of ( 5 ), will be provided free of charge upon request by the Contractor. Obtaining more copies shall be the responsibility of the Contractor including costs.

## SI10 TRANSMISSION OF THE BID BY FACSIMILE OR EMAIL

Bids transmitted by facsimile or email are not accepted.

## SI11 WEB SITES

The connection to some of the Web sites in the solicitation documents is established by the use of hyperlinks. The following is a list of the addresses of the Web sites:

Treasury Board Appendix L, Acceptable Bonding Companies
http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=text#appL

Contracts Canada (Buy and Sell) https://www.achatsetventes-buyandsell.gc.ca/eng/welcome

Canadian economic sanctions http://www.international.gc.ca/sanctions/index.aspx?lang=eng

Contractor Performance Evaluation Report (Form PWGSC-TPSGC 2913)
http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/2913.pdf

Bid Bond (form PWGSC-TPSGC 504)
http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/504.pdf

Performance Bond (form PWGSC-TPSGC 505)
http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/505.pdf

Labour and Material Payment Bond (form PWGWSC-TPSGC 506)
http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/506.pdf

Certificate of Insurance (form PWGSC-TPSGC 357)
http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/357.pdf

Standard Acquisition Clauses and Conditions (SACC) Manual
https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual

Schedules of Wage Rates for Federal Construction Contracts
http://www.rhdcc-hrsdc.gc.ca/eng/labour/employment_standards/contracts/schedule/index.shtml

PWGSC, Industrial Security Services Http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html

PWGSC, Code of Conduct and Certifications
Http://www.tpsgc-pwgsc.gc.ca/app-acq/cndt-cndct/index-eng.html

PWGSC Consent to a Criminal Record Verification (PWGSC-TPSGC 229)
Http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/229.pdf

# SUPPLEMENTARY CONDITIONS (SC)

## SC01 LIMITATION OF LIABILITY

GC1.6 of R2810D is deleted and replaced with the following:

GC1.6 Indemnification by the Contractor

1. The Contractor shall indemnify and save Canada harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings whether in respect to losses suffered by Canada or in respect of claims by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor in performing the Work, provided such claims are caused by the negligent or deliberate acts or omissions of the Contractor, or those for whom it is responsible at law.

2. The Contractor's obligation to indemnify Canada for losses related to first party liability shall be limited to:

   a. In respect to each loss for which insurance is to be provided pursuant to the insurance requirements of the Contract, the Commercial General Liability insurance limit for one occurrence. as referred to in the in the insurance requirements of the Contract .

   b. In respect to losses for which insurance is not required to be provided in accordance with the insurance requirements of the Contract, the greater of the Contract Amount or $5,000,000, but in no event shall the sum be greater than $20,000,000.

   The limitation of this obligation shall be exclusive of interest and all legal costs and shall not apply to any infringement of intellectual property rights or any breach of warranty obligations.

3. The Contractor's obligation to indemnify Canada for losses related to third party liability shall have no limitation and shall include the complete costs of defending any legal action by a third party. If requested by Canada, the Contractor shall defend Canada against any third party claims.

4. The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against Canada charging or claiming that the Work or any part thereof provided or furnished by the Contractor to Canada infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.

5. Notice in writing of a claim shall be given within a reasonable time after the facts, upon which such claim is based, became known.

## CONTRACT DOCUMENTS (CD)

1. The following are the contract documents:

   a. Contract Page when signed by Canada;
   b. Duly completed Bid and Acceptance Form and any Appendices attached thereto;
   c. Drawings and Specifications;
   d. General Conditions and clauses

| | | | |
|---|---|---|---|
| GC1 | General Provisions | R2810D | (2013-04-25) |
| GC2 | Administration of the Contract | R2820D | (2012-07-16); |
| GC3 | Execution and Control of the Work | R2830D | (2010-01-11); |
| GC4 | Protective Measures | R2840D | (2008-05-12); |
| GC5 | Terms of Payment | R2850D | (2010-01-11); |
| GC6 | Delays and Changes in the Work | R2860D | (2013-04-25); |
| GC7 | Default, Suspension or Termination of Contract | R2870D | (2008-05-12); |
| GC8 | Dispute Resolution | R2880D | (2012-07-16); |
| GC9 | Contract Security | R2890D | (2012-07-16); |
| GC10 | Insurance | R2900D | (2008-05-12); |
| | Supplementary Conditions | | |
| | Insurance Terms | R2910D | (2008-12-12); |
| | Fair Wages and Hours of Labour - Labour Conditions | R2940D | (2012-07-16); |
| | Allowable Costs for Contract Changes Under GC6.4.1 | R2950D | (2007-05-25); |
| | Schedules of Wage Rates for Federal Construction Contracts; | | |

   e. Any amendment issued or any allowable bid revision received before the date and time set for solicitation closing;
   f. Any amendment incorporated by mutual agreement between Canada and the Contractor before acceptance of the bid; and
   g. Any amendment or variation of the contract documents that is made in accordance with the General Conditions.

2. The documents identified by title, number and date above are incorporated by reference and are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site:
   https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual

3. Schedules of Wage Rates for Federal Construction Contracts is included by reference and may be accessed from the Web site:
   http://www.rhdcc-hrsdc.gc.ca/eng/labour/employment_standards/contracts/schedule/index.shtml.

4. The language of the contract documents is the language of the Bid and Acceptance Form submitted.

# BID AND ACCEPTANCE FORM (BA)

## BA01 IDENTIFICATION

Modernisation de l'éclairage des cours, Regional Reception Center, Ste-Anne-des-Plaines.

## BA02 BUSINESS NAME AND ADDRESS OF BIDDER

Name: _____

Address: _____

_____

Telephone: _____ Fax:_____ PBN: _____

## BA03 THE OFFER

The Bidder offers to Canada to perform and complete the Work for the above named project in accordance with the Bid Documents for the Total Bid Amount of

$ _____excluding GST/HST.
(amount in numbers)

## BA04 BID VALIDITY PERIOD

The bid shall not be withdrawn for a period of sixty [60] days following the date of solicitation closing.

## BA05 ACCEPTANCE AND CONTRACT

Upon acceptance of the Contractor's offer by Canada, a binding Contract shall be formed between Canada and the Contractor. The documents forming the Contract shall be the contract documents identified in Contract Documents (CD).

## BA06 CONSTRUCTION TIME

The Contractor shall perform and complete the Work within [40] weeks from the date of notification of acceptance of the offer.

## BA07 BID SECURITY

The Bidder is enclosing bid security with its bid in accordance with GI08 - Bid Security Requirements of R2710T - General Instructions to Bidders.

## BA08 SIGNATURE

_____

Name and title of person authorized to sign on behalf of Bidder (Type or print)

_____ _____

Signature Date

# APPENDIX 1 - COMPLETE LIST OF EACH INDIVIDUAL WHO ARE CURRENTLY DIRECTORS OF THE BIDDER

***NOTE TO BIDDERS***
***WRITE DIRECTOR'S SURNAMES AND GIVEN NAMES IN BLOCK LETTERS***

| ***SURNAME*** | ***NAME*** | ***TITLE*** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

CIMA+
Partners in excellence

# STE-ANNE-DES-PLAINES INSTITUTION

# COURTYARD LIGHTING UPGRADES

## ELECTRICITY SPECIFICATION

**ISSUED FOR TENDER**

Prepared and verified by :

2013-09-06

INGÉNIEUR
Tri Tan
124232
QUÉBEC

Tri Tan, Eng.

PROJECT N° : 550-2-343-3920
Ref. Cima+ : M02146A
September 6st, 2013

ISO 9001

740 Notre-Dame Street West., Suite 900
Montreal QC H3C 3X6
CANADA
740, rue Notre-Dame Ouest, bureau 900

**Phone : 514-337-2462**
Fax : 514-281-1632
**www.cima.ca**
**Tél.: 514 337-2462**

50 BEST MANAGED COMPANIES

## PART 1 - GENERAL

### 1.1 References

.1 National Building Code of Canada (NBC) 2010, including all amendments up to the date of bid closing.

### 1.2 Description of the work

.1 The project includes the following work. The list below is not necessarily exhaustive and in no way releases the Contractor from the obligation of carrying out the project in its entirety according to generally accepted practices as well as the intentions and general principles as described in these specifications and drawings.

1. Supply and install :
   - .1 Exterior lighting system completed with poles.
   - .2 Lighting control system completed with contactors, timer and photocell.
   - .3 Replacement of existing feeders.
   - .4 Demolition of existing light poles and feeders.
   - .5 The rental and deployment of a crane for the installation of concrete blocs and light poles.

### 1.3 Specialized subcontractors

.1 The General Contractor is responsible to hire all subcontractors to realize this project. The General Contractor is also responsible to coordinate work between all subcontractors in order to obtain the result expected in this document. The General Contractor shall inform Correctional Service of Canada of any errors or omission before the beginning of this project.

### 1.4 License

.1 At any time during the work, the General Contractor and the specialized subcontractors must have their valid licenses in accordance with the “Loi sur les bâtiments”. Should their license expire during the work, the General Contractor and the specialized subcontractors must present the proof of renewal to Correctional Service of Canada.

### 1.5 Site inspection by bidders

.1 For security reasons at the penitentiary, the site inspection shall be conducted at a set time that will be specified in the tender documents. The meeting place will be the main entrance of the institution concerned. The site inspection is mandatory.

.2 The Contractor shall examine the site and conditions that could have an impact on the work prior to submitting his proposal. Submitting a bid indicates that the bidder accepts the terms and conditions of the solicitation and agrees to be bound by them.

1.6 Security screening

.1 All workers shall undergo security screening in order to be granted a security classification as required by the Correctional Service of Canada

.2 Section 01 35 13 provides a detailed description of the procedures involved in the security screening.

.3 At the start of work, a job-site special meeting will be held with institution representatives to define the instructions governing security and site operation in a correctional environment.

1.7 Codes

.1 The specifications will require that the work and materials comply with the National Building Code of Canada (NBC) and all other applicable provincial or local codes. The strictest requirements shall apply in case of contradiction or discrepancy.

.2 The work shall be performed in a manner that meets or exceeds the following requirements:
- .1 Contract documents
- .2 Specified standards and codes as well as other documents cited as references

1.8 Required documents

.1 A copy of the following documents shall be kept at the job site:
- .1 Contract drawings
- .2 Specifications
- .3 Amendments
- .4 Amended shop drawings
- .5 Modification orders
- .6 Other contract amendments
- .7 On-site test reports
- .8 Approved work schedule
- .9 Manufacturer installation and start-up instructions

1.9 Subsoil study

.1 A subsoil test report is available for consultation, attached to the specifications at the end of section (Appendix A).

1.10 Work schedule

.1 The successful bidder shall initiate work immediately upon receiving notice that the contract has been awarded. The work covered by this document, including measures to correct construction deficiencies, must be completed within the schedule specified herein. Failure to comply with the schedule shall be dealt with as provided for in the Standard Acquisition Clauses and Conditions (SACC) Manual, Public Works and Government Services Canada (PWGSC).

.2 Within ten (10) business days of contract award, submit a work schedule for the various project phases and the completion date, which must be within two (2) weeks of contract award.

.3 Within ten (10) business days of contract award, submit shop drawings, technical data sheets, samples, and security screening applications for approval.

.4 The work sequence is as follows:

.1 Start-up meeting and schedule submission, shop drawings, technical data sheets, samples, and security screening applications for approval.
.2 Approval of documents submitted.
.3 Construction start-up.
.4 Phase 1:
- Installation of lighting control system.
- Excavation works and installation of the light poles and the concrete bases. All works can be executed simultaneous for the three (3) courtyards.
- Submission of operating and maintenance manuals for approval.
- Installation of underground feeder.
- Installation of existing lamppost on the new concrete bases for temporary lighting.
- Modification of the existing electrical infrastructure.

.5 Phase 2 :
- Dismantle the lamppost for temporary lighting.
- Installation of the new lamppost and perform testings.

.6 Provisional acceptance.
.7 Training of maintenance and/or operating personnel.
.8 Correction of deficiencies.
.9 Final approval.

.5 Within ten (10) business days of contract award, the Contractor shall provide, in a format acceptable to the Project Manager, a work schedule indicating:

.1 Dates for submitting shop drawings, lists of materials, and samples

.2 Delivery dates for the following pieces of equipment and materials:
- Breakers for the modification of existing panels
- Lighting control system
- Concrete base
- Light poles

.3 Start-up and completion dates for the work described in each section of the specifications

.4 Final completion date with respect to the completion date stipulated in the contract documents

.6 Changes to milestones in the submitted schedule shall be at the discretion of the CSC Project Manager. The schedule shall be updated by the Contractor with the cooperation and approval of the CSC Project Manager.

.7 The following work shall be performed outside normal working hours: services shutdown and installation of new breakers in the existing panels. This work must be coordinated with the CSC Project Manager. Advise the project manager four (4) working days before any shutdown.

1.11 Acceptance of equivalents

.1 In case where materials as per designation, a trademark, a manufacturer or a supplier are specified, the quotation shall be based on the designated materials. During the period of tender, the replacement of materials could be considered only the contract officer has received in writing the completed technical data at least ten (10) days before the tender closing. If the replacements of materials are approved for the purpose of submitting, an addendum will be issued for the tender documents.

.2 The Contractor shall be responsible for providing supporting data of equivalence. The substitution request must be presented clearly and include all the details required to analyze it properly.

.3 The main criteria for accepting substitutions are: construction, performance, capacity, dimensions, arrangement of connections, availability of replacement parts, ease of maintenance, delivery times, the existence of similar equipment in service for some time.

.4 If a proposed substitution requires changes to installations shown on plans or in specifications, the General Contractor shall be responsible for such changes and shall also assume responsibility for the ensuing modifications that may be required to the work of specialized subcontractors.

1.12 Cost breakdown

.1 With the bid, the Contractor shall present an itemized breakdown of the costs related to this contract, including the overall contract value, as listed below. Once approved, the cost breakdown will be used as a baseline for calculating progress payments.

.2 For the costs breakdown, fill the tender form provided in the Appendix B.

1.13 Working Procedures

.1 The contractor shall provide all procedure at the beginning of the project for the installation of lampposts, the excavation works, the dismantle of the lighting lampposts.

1.14 Spare parts

.1 Include in the tender price the following spare parts :
- Lighting contractor completed with timer and photoelectric cell;
- 5 lamps for the lamppost.

1.15 Contractor's use of the site

.1 The institution must remain fully operational during construction. With this end in view, the CSC Project Manager or the institution's head of security can require the Contractor to halt work immediately on a temporary basis to prevent institution activities from being compromised.

.2 Use of premises; limited access to the job site. Work and affected engineering structures outside the construction site must be carried out by a crew accompanied by an escort provided by CSC (see section 01 35 13).

.3 The Contractor shall perform the work so as to disturb the occupants as little as possible and, to the degree possible, ensure that normal use can be made of the facilities. The Contractor shall also cooperate with the CSC Project Manager to facilitate performance of the work.

.4 Existing services in the buildings must be maintained during the project.

.5 No vehicle or mobile construction equipment shall remain on institution premises outside of working hours. All construction vehicles must be parked in the lot in front of the postern (main entrance). Refer to section 01 35 13.

1.16 Noisy environment and cell-phone use

.1 No radios or "boom boxes" shall be tolerated at the job site.

.2 Cell telephones are prohibited within the perimeter of the penitentiary.

1.17 Parking at the site

.1 The Contractor shall restrict parking to those areas authorized by the Institutional Head.

1.18 Job-site meetings

.1 Job-site meetings shall be held at times and places subject to the approval of the CSC Project Manager.

.2 All participants shall be informed of meetings being called.

.3 The Engineer shall organize job-site meetings, set their dates and times, and ensure that minutes are drafted and distributed.

1.19 Construction staking

.1 The elevations shall be established and the site fully staked based on control points and elevations indicated on the plans and in the specifications.

.2 The Contractor shall assume full responsibility for staking the site and ensure complete implementation according to the location, lines, and grades indicated.

.3 The Contractor shall provide the material required for staking.

.4 The Contractor shall provide the materials required, such as rules and models, to facilitate the Engineer's work when inspecting staking work.

.5 The Contractor shall provide stakes and the like required to carry out staking work.

1.20 Location of equipment and various pieces of equipment

.1 The location of various devices and pieces of equipment as well as the electrical outlets indicated on the drawings and in the specifications must be considered approximate.

.2 The Contractor shall install equipment and devices as well as distribution networks so as to limit hindrances and keep the largest amount of useful space possible while complying with manufacturer recommendations related to safety, access, and maintenance.

.3 The Contractor shall inform the Project Manager of the installation date and request approval for the designated location.

.4 When so requested by the Project Manager, the Contractor shall provide location plans indicating the relative positions of equipment and networks.

1.21 Concealed works

.1 Unless indicated otherwise, pipes, conduits, ducts, and wiring in floors, walls, and ceilings in finished areas shall be concealed.

1.22 Drilling and sealing

.1 The Engineer's approval shall be obtained before cutting or drilling in bearing members or inserting sleeves.

.2 Drilling and sealing shall be performed so as to ensure that connections are exact and with no play.

.3 Holes and openings must be clean, straight, and smooth.

.4 When the addition of a new structure requires modifications to an existing one, all required drilling, sealing, and other repairs shall be carried out to restore the existing structure to its condition prior to the work.

1.23 Existing systems

.1 When connections must be made to existing systems, the work shall be carried out at times determined by local authorities and performed so as to minimize disruption of pedestrian and vehicular traffic.

.2 A work schedule shall be submitted to the CSC Project Manager for approval at least 48 hours prior to any existing services or system being interrupted. The approved schedule shall be followed; the individuals affected shall be informed beforehand.

.3 Should installations be discovered during the course of work, the Engineer shall be immediately informed and a written report containing the observations provided to him.

.4 All conduits for disused services within a radius of 2 m from any structure shall be removed. Conduits that have been cut shall be capped or otherwise plugged, as directed by the Engineer.

.5 There shall be a record of the location of conduits that have been maintained in service, deviated, or abandoned.

1.24 Modifications, addition, or renovation of existing buildings

.1 The Contractor shall perform the work so as to disturb the occupants as little as possible and, to the degree possible, ensure that normal use can be made of the facilities. The Contractor shall also cooperate with the CSC Project Manager to facilitate performance of the work.

.2 At no time shall the safety measures be relaxed because of the work to be carried out under this contract. The Contractor shall take the steps required to ensure the level of safety required.

.3 The Contractor shall use only those elevators, freight elevators, conveyors, and escalators reserved for his or her use to move materials and personnel. Before the Contractor uses an elevator, the cabin walls shall be protected as directed by the Engineer. The Contractor accepts liability for any damage to such devices, for their safe and proper use, and for any overloading of the existing equipment.

.4 When work is to be carried out in occupied spaces, the Contractor shall provide and install whatever is required to protect the furnishings, equipment, and finish work; install dust barriers, partitions, and temporary notices; and clean the area at the end of each work day.

1.25 Supplemental drawings

.1 The Engineer may provide supplemental drawings for clarification Such supplemental drawings shall be considered to have the same meaning and scope as the contract documents.

1.26 Remains and antiques

.1 Remains, antiques, and other items of historical or scientific interest, such as cornerstones and their contents, commemorative plaques, and other objects bearing inscriptions discovered during the project.

.2 The CSC Project Manager shall be informed immediately; authorization in writing is required before work can be resumed.

.3 Remains, antiques, and other items of historical or scientific interest are the property of the Crown.

1.27 Restrictions related to tobacco use

.1 Restrictions regarding the use of tobacco inside buildings shall be complied with, see section 01 35 13, article 2.2.

1.28 Asbestos

.1 Removing sprayed or troweled-on asbestos can be a health risk. If, during the course of the work, the Contractor encounters materials that appear to be sprayed or troweled-on asbestos, he shall halt work and immediately inform the Engineer. Work shall not be resumed unless so authorized in writing by the Engineer.

1.29 Operating manual

.1 The Contractor shall submit, for approval, three (3) copies of an operating manual containing the following items:

- Table of contents
- List of suppliers and their contact information
- Warranties
- Approved shop drawings
- Operating and maintenance guides
- As-built drawings

1.30 Personnel training

.1 The Contractor shall provide one (1) period of training for the personnel in charge of systems maintenance and new installations of lighting control system:

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

## PART 1 - GENERAL

### 1.1 Administrative

.1 Submit to Consultant 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 Consultant. 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 Consultant, 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 Consultant's review of submittals.

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

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

### 1.2 Shop drawings and product data

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province and Territories of 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 ten (10) days for Consultant's review of each submission.

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

.6 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant 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 Date and revision dates.
.2 Project title and number.
.3 Name and address of:
.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.
.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
.5 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.

.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

.9 After Consultant's review, distribute copies.

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

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

.12 Submit electronic copy of test reports for requirements requested in specification Sections and as requested by Consultant.
.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 electronic copy of certificates for requirements requested in specification Sections and as requested by Consultant.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

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

.17 Submit electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.

.18 Delete information not applicable to project.

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

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

.21 The review of shop drawings by Ministerial 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 as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to site office.

.3 Notify Consultant 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 Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant 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.

## PART 2 - PRODUCTS

### 2.1 NOT USED

.1 Not Used.

## PART 3 - EXECUTION

### 3.1 NOT USED

.1 Not Used.

1. Purpose

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

2. Definitions

.1 "Contraband" means:

a) an intoxicant, including alcoholic beverages, drugs and narcotics,
b) a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,
c) an explosive or a bomb or a component thereof,
d) currency over any applicable prescribed limit 25,00$, and
e) any item not described in paragraphs a) to d) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization

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

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

.4 "CSC" means Correctional Service Canada.

.5 "Director" means Director or Warden of the Institution as applicable or their representative.

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

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

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

.9 "Construction zone" means the area as shown on the contract drawings where the contractor will be allowed to work. This area may or may not be isolated from the security area of the institution. The work zones are as follows :
- “Centre de réception régionale (CRR) – Building C – Electrical room.
- “Centre de réception régionale (CRR) – Basement buildings D, E & F.
- “Centre de réception régionale (CRR) – Courtyards buildings D, E & F.

3. Preliminary

.1 Prior to the commencement of work, the contractor shall meet with

proceedings

the Director to:

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

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

.2 The contractor will:

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

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

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

4. Construction employees

.1 Submit to the Director a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.

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

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

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

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

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

.2 behave in an unusual or disorderly manner.

.3 are in possession of contraband.

5. Vehicles

.1 All unattended vehicles on CSC property shall have windows closed;

doors and trunks shall be locked and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle.

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

.3. Drivers of delivery vehicles for material required by the project shall not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or Commissionaires while in the Institution.

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

6. Parking

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

7. Shipments

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

8. Telephones

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

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

.3 Wireless cellular and digital telephones, including but not limited to

devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the perimeter of the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.

.4. The Director may approve but limit the use of two way radios.

9. Work hours

.1 Work hours within the Institution are: Monday to Thursday 7 h 00 a.m. (7 h) to 5 h 00 p.m. (17 h.).

.2 Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waved by the Director.

10. Overtime work

.1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such the completion of a concrete pour or work to make the construction safe and secure, the contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to Canada for such events may be attributed to the contractor.

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

11. Tools and equipment

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

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

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

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

.5 Lock all tool boxes when not in use. Keys to remain in the

possession of the employees of the contractor.

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

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

.8 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
- .1 At the beginning and conclusion of every construction project.
- .2 Weekly, when the construction project extends longer than a one week period.

.9 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.

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

12. Keys

.1 Security Hardware Keys
- .1 The Contractor shall arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
- .2 The SMO will provide a receipt to the Contractor for security hardware keys.
- .3 The contractor will provide a copy of the above-mentioned receipt to the Departmental Representative.

.2 Other Keys
- .1 The contractor will use standard construction cylinders for locks for his use during the construction period.
- .2 The contractor will issue instructions to his employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.
- .3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:
  - .a Prepare an operational keying schedule;
  - .b accept the operational keys and cylinders directly from the lock manufacturer;
  - .c Arrange for removal and return of the construction

cores and install the operational core in all locks.

.4 Upon putting operational security keys into use, the CSC construction escort shall obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the CSC construction escort.

13. Security hardware

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

14. Prescription drugs

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

15. Smoking restrictions

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

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

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

16. Contraband

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

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

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

.4. Presence of arms and ammunition in vehicles of contractors, sub-

contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

17. Searches

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

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

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

18. Access to and removal from institutional property

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

19. Movement of vehicles

.1 Escorted commercial vehicles will be allowed to enter or leave the institution through the vehicle access gate during the following hours:
.1 7 h à 17 h.
Construction vehicles shall not leave the Institution until an inmate count is completed.

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

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

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

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

.6 Private vehicles of construction employees will not be allowed within the security perimeter of medium or maximum security institutions

without the authorization of the Director.

.7. With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.

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

20. Movement of construction employees on institutional property

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

.2 However, notwithstanding paragraph above, the Director may:
- .1 Prohibit or restrict access to any part of the institution.
- .2 Require that in certain areas of the institution, either during the entire construction project or at certain intervals, construction employees only be allowed access when escorted by a member of the CSC security staff or a commissionaire.

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

21. Surveillance and inspection

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

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

22. Stoppage of work

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

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

23. Contact with inmates

.1. Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any construction employee doing any of the above will be removed from the site and his security clearance revoked.

.2 It is to be noted that cameras are not allowed on CSC property.

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

24. Completion of construction project

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

25. Lockout Procedure

.1 The contractor shall provide to CSC a lockout procedure for the replacement of breakers as per shown on drawings.

## PART 1 - GENERAL

**1.1 Content of section**

.1 The general contractor must make sure that during his activities, the public and his employees' health and safety and the protection of the environment will always prevail on cost or schedule issues.

**1.2 References**

.1 Working Canadian code, part II, Canada Occupational Safety and Health Regulations.

.2 Canadian Standard Association (CSA).

.3 Workplace Hazardous Materials Information System (SIMDUT) /Health Canada.
1. Data sheet.

.4 Act respecting Occupational health and safety, L.R.Q. Chapter S-2.1, 2002.

.5 Safety Code for the construction industry, S-2.1, r.6, 2001.

**1.3 Documents/ samples**

.1 Submit all documents and samples in conformity with the section 01 00 50 – General instructions.

.2 10 days before construction start, transmit to the CSC representative and to the "Commission de la santé et de la sécurité du travail (CSST)" the health and safety program specific to the construction activity as described in the section 1.8. If necessary, the general contractor must update his prevention program to reflect any changes to the initial plans. Following the reception of the prevention program and at any time during the work, the CSC representative can ask for its modification to adapt it to the work on site. The general contractor will have to proceed with the required modifications before work start.

.3 Transmit to the CSC representative a copy of any federal or provincial inspector's inspection reports, notice of corrections or recommendations within 24 hours of their reception.

.4 Transmit to the CSC representative any investigation report concerning any accident with injury or pointing out any potential hazard for health and safety within 24 hours of their reception.

.5 Transmit to the CSC representative the data sheet for all controlled product at least three (3) days before they are used on site.

.6 Transmit to the CSC representative a copy of the formation

certificates required for the application of the prevention program including :

.1 General health and safety course on work sites;
.2 Security agent certificate;
.3 First-aid and CPR on work sites;
.4 Work subject to asbestos conditions;
.5 Work in enclosed spaces;
.6 Locking/securing procedures;
.7 Wearing and adjustment of individual protection equipments;
.8 Forklift truck safe use;
.9 Working platform lift;
.10 and any other formation required by regulations or by the prevention program.

.7 Medical examinations: when required by law, regulation, directive, specification or by a prevention program, the general contractor must :

.1 Before mobilisation, transmit to the CSC representative the medical examination certificate for all surveillance employees and any other employee attending the first site meeting concerned by this article's first paragraph.
.2 Afterwards, transmit as one goes along and without any delays all medical examination certificates of any new incoming worker concerned by this article's first paragraph.

.8 Emergency plan: the emergency plan, as described in the article 1.7.3, must be transmitted to the CSC representative with the prevention program.

.9 Notice of work start: the notice of work start must be transmitted to "Commission de la santé et de la sécurité du travail" before the work start and copied to the CSC representative. A copy of this notice must be available and visible on site at all time. During demobilisation, the notice of end of work must be transmitted to the CSST with a copy to the CSC representative.

.10 Engineer's plans and notice of conformity: the general contractor must transmit to the CSST and to the CSC representative an engineer' signed and sealed copy of all the plans and notice of conformity required in virtue of the Safety Code for the construction industry (S-2.1, r. 6), of any other law, rules or any clause from the specifications or the contract. A copy of those documents must be available at all time on the work site.

.11 Certificate of conformity delivered by the CSST: the certificate of conformity is a document delivered by the CSST and confirms that the general contractor complies with the CSST requirements, that he has paid all amount due in relation with the awarded contract. This document must be transmitted to the CSC representative at the end of work.

1.4 Evaluation of the risks

.1 The general contractor must identify all related risks to the various tasks on site.

.2 The general contractor must plan and organize his work in order to favour the elimination of the danger at the source or the collective protection and minimize the use of individual protection equipments. When the use of individual protection equipment is required in situations of falling hazards, the workers must use a safety harness in conformity with the norm CAN/CSA-Z-259.10-M90. The safety belt must not be used as a falling protection.

.3 Any equipment, tool or mean of protection that cannot be installed or used without compromizing the health and safety of the workers is considered inadequate for the work.

.4 All mechanical equipments must be inspected before their delivery on site. Before using mechanical equipment, the general contractor must transmit to the CSC representative a certificate of conformity signed by an approved mechanic. At any time, if the CSC representative suspects a defect or a risk of accident, he can order the immediate shutdown of the machine and require a second inspection performed by a specialist of his choice.

1.5 Meetings

.1 A decision-making representative of the general contractor must attend all meetings about job site health and safety issues.

1.6 Ruling agency requirements

.1 Comply with all rules, regulations and applicable norms for the execution of the work.

.2 Follow the prescribed norms and rules in order to assure a normal course of events in the work progress in situations of contaminated grounds by toxic products.

.3 Despite the publication date of the indicated norms in the Safety Code for the construction industry, always use its most recent and applicable version during work.

1.7 Health and safety management

.1 Accept and assume all tasks and obligations normally assigned to the master-builder in accordance with the “Loi sur la santé et la sécurité du travail” (L.R.Q., chapitre S-2.1) and the Safety Code for the construction industry (S-2.1, r.6).

.2 Develop a prevention program specific for the work based on identification of the risks and put this program in application from the

beginning of work to its demobilization. The prevention program must take into account the information in the article 1.7. It must be transmitted to all person involved in conformity with the article 1.2. The prevention program must include :

.1 The business policy regarding health and safety;
.2 The description of the work, the total cost of the work, the schedule with its workforce chart;
.3 A flowchart of the health and safety's responsibilities;
.4 The physical and material organization of the job site;
.5 The first-aid norms;
.6 The identified risks on the job site;
.7 The identification of the risks related to the work to be executed, including the prevention program and their applicability modality;
.8 The required formation;
.9 The procedures in situation of accident/injuries;
.10 A written commitment from all stakeholders to comply with this prevention program;
.11 A job site inspection schedule based on the prevention measures.

.3 The general contractor must develop an efficient emergency plan, in relation with the job site characteristics and conditions. The emergency plan must be transmitted to all involved stakeholders, in conformity with the article 1.2. The emergency plan must include :

.1 The evacuation procedure;
.2 The identification of the resources (police, firefighter, ambulance, etc.);
.3 The identification of the persons in charge of the job site;
.4 The identification of the first-aiders;
.5 The required formation for the persons in charge of its application;
.6 And any other information necessary related to the job site characteristics.

1.8 Responsibilities

.1 No matter what is the size of the job site or the number of workers on site, always have an identified competent supervisor responsible of the health and safety. Take all necessary measures to assure the health and safety of peoples and goods on and in the proximity of the job site that could be affected by the execution of the work.

.2 Take all necessary measures to assure the application and the respect of all health and safety requirements indicated in the contractual documents, the federal and provincial regulations, the

applicable norms and the prevention program specific for the job site and comply immediately to any prescription or notice of correction issued by the CSST.

.3 Take all necessary measures to maintain the job site clean and in good order during the work.

1.9 Communication and signage

.1 Take all necessary measures to assure an efficient communication of the health and safety information on the job site. As soon as they arrive on the job site, all workers must be informed of the particularities of the prevention program, of their obligations and rights. The general contractor must insist on the worker's right to refuse to execute a work if they believe this work could imperil their health, their safety, their own physical integrity or the one of the other persons on the job site. The general contractor must maintain on the job site an updated register with the information transmitted and the signature of all the workers who received this formation.

.2 The following information and documents must be displayed in an easily accessible place for the workers :

.1 Notice of work start;
.2 Identification of the master-builder;
.3 The business policy regarding health and safety at work;
.4 The prevention program specific to the job site;
.5 The emergency plan;
.6 Data sheet of all controlled products used on the job site;
.7 Minutes of meeting of the construction site committee;
.8 Name of the first-aiders;
.9 Intervention and correction reports published by the CSST.

1.10 Unforeseens

.1 When a source of danger not specified in the specifications and not identified during the preliminary inspection of the job site occurs during the execution of the work, the general contractor must immediately stop the work, set up temporary protection measures for the workers and the public and warn the CSC representative verbally and by writing. The general contractor must afterwards proceed with the necessary modifications to the prevention program for the work to resume safely.

1.11 Dynamiting

.1 Dynamiting and the use of explosives is forbidden, unless authorized by written by the CSC representative.

.2 Any operation involving explosives must be executed under the immediate supervision of a qualified blaster.

.3 The acquisition, the transport, the storage and the use of explosives must respect all applicable federal and provincial rules and regulations.

.1 Canada: Explosives Act (E-17), Explosives regulations (C.R.C. CH. 599), norm related to the storage of explosives and detonators, TDG Act & Regulations.

.2 Quebec: Act respecting explosives (E-22), Regulation under the Act respecting explosives (E-22, r.1), Safety Code for the construction industry (S-2.1, r.6), Regulation on the transportation of dangerous substances.

.4 The general contractor must secure all required permits in accordance with the above mentioned rules and regulations and he must keep a copy easily accessible on the job site.

.5 The general contractor must facilitate the visit of the job site, of the explosives deposits and the inspection of the vehicles used for their transportation to all governmental representatives and police officers accredited to supervise explosives.

1.12 Caulking guns and other cartridge devices

.1 Caulking guns or any other cartridge devices are forbidden on the CSC property.

## PART 1 - GENERAL

### 1.1 Project cleanliness

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

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

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

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

.5 Provide and use marked separate bins for recycling.

.6 Dispose of waste materials and debris.

.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 on site, unless approved by Departmental Representative.

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

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

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

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

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

.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

.1 Separate waste materials for reuse and recycling.

management and
disposal

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

## PART 1 - GENERAL

### 1.1 References

.1 Canadian Standards Association (CSA International)
.1 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
.2 CSA C22.2.
.3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC).

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

### 1.2 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.

### 1.3 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 nameplates and labels for control items in English and French.

.4 Use one nameplate or label for both languages.

### 1.4 Action and informational submittals

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

.2 Shop drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Provinces and Territories of 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 Submit a copy of shop drawings and product data in PDF format to inspection authorities.

.6 If changes are required, notify Consultant of these changes before they are made.

.7 The Consultant reserves within ten (10) working days for verifying and returning the shop drawings.

.8 All catalog sheet and information sheet will ot be accepted.

.9 The Contractor shall submit an electronic file for each product. Each file shall be named by the product name. The number and the title of the project shall be indicated in the shop drawings.

.10 Submit these following shop drawings for verification:
- light pole complete with lamps and ballasts
- breakers to be installed in the substation
- lighting control and control schematic
- transformers

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

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special 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.

.7 Manufacturer's Field Reports: submit to Consultant manufacturer's written report, within three (3) days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 Quality assurance

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

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction as per the conditions of Provincial Act respecting manpower vocational training and qualification.
.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.3 Site Meetings:
.1 In accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).
.2 Site Meetings: as part of Manufacturer's Field Services described in Part 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
.1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety.

1.6 Delivery, storage and handling

.1 Material Delivery Schedule: provide DCC Representative and Consultant with schedule(in MS Project format) within two (2) weeks after award of Contract.

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

1.7 System startup

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

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

.3 Provide these services for such period, and for as many visits

as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.8 Operating instructions

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

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

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

.4 Post instructions where directed.

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

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

## PART 2 - PRODUCTS

2.1 Materials and equipment

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

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

.3 Factory assemble control panels and component assemblies.

2.2 Electric motors, equipment

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

and controls

2.3 Warning signs

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

.2 Porcelain enamel signs, minimum size 175 x 250 mm.

2.4 Wiring terminations

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

2.5 Equipment identification

.1 Identify electrical equipment with nameplates and labels as follows:
.1 Nameplates: lamicoid 3 mm melamine, black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.
.2 Sizes as follows:

NAMEPLATE SIZES

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

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

.3 Wording on nameplates and labels to be approved by Consultant prior to manufacture.

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

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

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

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

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

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

2.6 Wiring identification

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

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

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

2.7 Conduit and cable identification

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

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

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

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

2.8 Finishes

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

.1 Paint outdoor electrical equipment "equipment green" finish.

## PART 3 - EXECUTION

### 3.1 Installation

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

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

### 3.2 Nameplates and labels

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

### 3.3 Conduit and cable installation

.1 Install conduit and sleeves prior to pouring of concrete.
.1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

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

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

### 3.4 Location of outlets

.1 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.2 Locate light switches on latch side of doors.
.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

### 3.5 Mounting heights

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

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

3.6 Co-ordination of protective devices

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

3.7 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 - 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 Circuits originating from branch distribution panels.
.2 Lighting and its control.
.3 Insulation resistance testing:
.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
.3 Check resistance to ground before energizing.

.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 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in

PART 1 - QUALITY ASSURANCE.

3.8 Cleaning

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

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

## PART 1 - GENERAL

**1.1 Content of section**

.1 Wire and box connectors, related material and installation.

**1.2 References**

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .2 CSA C22.2 No.65-93(R1999), Wire Connectors.

.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 Waste management and disposal**

.1 Separate and recycle waste materials.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by Departmental Representative and Consultant.

## PART 2 - PRODUCTS

**2.1 Materials**

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

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

.3 Clamps or connectors for armoured cable as required to: CAN/CSA-C22.2 No 18.

## PART 3 - EXECUTION

### 3.1 Installation

.1 Remove insulation carefully from ends of conductors and:

.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 CSA C22.2 No.65.

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

## PART 1 - GENERAL

**1.1 Related requirements**

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

**1.2 Product data**

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

**1.3 Delivery, storage and handling**

.1 Packaging Waste Management: remove for reuse and return by manufacturer of crates and packaging materials.

## PART 2 - PRODUCTS

**2.1 Building wires**

.1 Conductors: stranded for 8 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE. All conductors use for buried feeders shall be rated as RW90 XLPE.

**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.
- .2 Circuit conductors: copper, size as indicated.

.3 Insulation:
- .1 Cross-linked polyethylene XLPE.
- .2 Rating: 600 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: galvanized steel.

.6 Fastenings:
.1 One hole zinc 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. Leave a biggest size cable for space between cables.
.3 Threaded rods: 6 mm diameter to support suspended channels.

.7 Connectors:
.1 Watertight, approved for TECK cable.

## 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 conductor tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

### 3.2 Installation of building wires

.1 Install wiring as follows:
.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

### 3.3 Installation of control cables

.1 Install control cables in conduit.

.2 Ground control cable shield.

## PART 1 - GENERAL

**1.1 Related requirements**

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

**1.2 References**

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)
.1 ANSI/IEEE 837-1989(R1996), Qualifying Permanent Connections Used in Substation Grounding.

.2 Canadian Standards Association, (CSA International).

**1.3 Waste management and disposal**

.1 Separate and recycle waste materials.

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

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.

.5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

**2.1 Equipment**

.1 Clamps for grounding of conductor: size as indicated to electrically conductive underground water pipe.

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

.3 Rod electrodes: copper clad steel 19 mm dia by 3 m long.

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

.5 Insulated grounding copper conductors: green, type RW90.

## PART 3 - EXECUTION

### 3.1 Installation general

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

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

.3 Protect exposed grounding conductors from mechanical injury.

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

.5 Soldered joints not permitted.

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

.7 Install separate ground conductor to outdoor lighting standards.

.8 Ground secondary service pedestals.

### 3.2 Field quality control

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

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

## PART 1 - GENERAL

**1.1 Waste management and disposal**

.1 Separate and recycle waste materials.

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

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.

.5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

**2.1 Support channels**

.1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended.

## PART 3 - EXECUTION

**3.1 Installation**

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

.2 Fasten exposed conduit or cables to building construction or support system using straps.
.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
.2 Two-hole steel straps for conduits and cables larger than 50 mm.
.3 Beam clamps to secure conduit to exposed steel work.

.3 Suspended support systems.
.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

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

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

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

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

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

## PART 1 - GENERAL

**1.1 References**

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-10, Canadian Electrical Code, Part 1, 21st Edition.

**1.2 Action and informational submittals**

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

**1.3 Delivery, storage and handling**

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

## PART 2 - PRODUCTS

**2.1 Splitters**

.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

**2.2 Junction and pull boxes**

.1 Construction:welded steel enclosure.

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

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

**2.3 Cabinets**

.1 Construction: welded sheet steel hinged door, latch and catch

.2 Type E Empty: surface return flange flush overlapping sides mounting.

## PART 3 - EXECUTION

### 3.1 Splitter installation

.1 Mount plumb, true and square to building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

### 3.2 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 except where indicated otherwise.

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

### 3.3 Identification

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

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

## PART 1 - GENERAL

### 1.1 References

.1 Canadian Standards Association (CSA International)
- .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.

### 1.2 Waste management and disposal

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

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

## PART 2 - PRODUCTS

### 2.1 Conduits

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

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

.3 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.4 Flexible metal conduit: to CSA C22.2 No. 56, steel liquid-tight flexible metal.

### 2.2 Conduit fastenings

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

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

.3 Channel type supports for two or more conduits at a distance on centre as per Electrical Code prescription.

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

.5 Two hole fixing clamps for threaded rigid conduit.

2.3 Conduit fittings

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

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

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

2.4 Expansion fittings for rigid conduit

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 Fish cord

.1 Polypropylene.

## PART 3 - EXECUTION

3.1 Manufacturer's instructions

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

3.2 Installation

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use electrical metallic tubing (EMT) except in cast concrete.

.4 Use rigid pvc conduit underground.

.5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

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

.7 Mechanically bend steel conduit over 19 mm diameter.

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

.9 Install fish cord in empty conduits.

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

.11 Dry conduits out before installing wire.

3.3 Surface conduits

.1 In the correctional facilities, all conduit installed at a height less than 8 600 mm (from floor or ground level) must be rigid metal conduit galvanized steel threaded, fixed with double anchor strap.

.2 Run parallel or perpendicular to building lines.

.3 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.4 Run conduits in flanged portion of structural steel.

.5 Group conduits wherever possible on suspended channels.

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

.7 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.

## PART 1 - GENERAL

**1.1 Content of section**

.1 Material and components for dry type transformers up to 600 V primary, related material designation and installation.

**1.2 Related requirements**

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

**1.3 References**

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA-C22.2 No.47-M90(R2001), Air-Cooled Transformers (Dry Type).
.2 CSA C9-M1981(R2001), Dry-Type Transformers.

.2 National Electrical Manufacturers Association (NEMA)

**1.4 Product data**

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

**1.5 Waste management and disposal**

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

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

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused wiring materials from landfill to metal recycling facility as approved by Consultant.

.5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

### 2.1 Transformers

.1 Use transformers of one manufacturer throughout project and in accordance with CAN/CSA-C22.2 No.47 CSA-C9.

.2 Design 1.
- .1 Type: ANN.
- .2 3 phases, size and voltage as indicated.
- .3 Voltage taps: standard.
- .4 Insulation: Class H220, 150 degrees C temperature rise.
- .5 Basic Impulse Level (BIL): 10 kV.
- .6 Hipot: standard.
- .7 Average sound level: standard.
- .8 Impedance at 17 degrees C: standard.
- .9 Enclosure: CSA, removable metal front panel.
- .10 Mounting: floor or wall.
- .11 Finish: in accordance with Section 26 05 00 - Common Work Results - Electrical.

### 2.2 Equipment identification

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Label size: 7.

.3 Nameplate wording: as per confirmed by DCC Representative.

## PART 3 - EXECUTION

### 3.1 Installation

.1 Mount dry type transformers up to 75 kVA.

.2 Ensure adequate clearance around transformer for ventilation.

.3 Install transformers in level upright position.

.4 Remove shipping supports only after transformer is installed and just before putting into service.

.5 Loosen isolation pad bolts until no compression is visible.

.6 Make primary and secondary connections in accordance with wiring diagram.

.7 Energize transformers after installation is complete.

## PART 1 - GENERAL

### 1.1 References

.1 Section 26 28 23 – Disconnect Switches – Fused and Non-Fused.

### 1.2 Action and informational submittals

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

.2 Product Data:
.1 Provide fuse performance data characteristics for each fuse type. Performance data to include: average melting time-current characteristics.

.3 Shop Drawings:
.1 Provide shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit drawings stamped and signed by professional engineer registered or licensed in Provinces or Territories of Canada.

### 1.3 Delivery, storage and handling

.1 Ship fuses in original containers.

.2 Do not ship fuses installed in switchboard.

.3 Store fuses in original containers in storage cabinet, moisture free location.

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

## PART 2 - PRODUCTS

### 2.1 Fuses - general

.1 Fuses: product of one manufacturer.

### 2.2 Fuse types

.1 Class C fuses.

## PART 3 - EXECUTION

### 3.1 Installation

.1 Install fuses in mounting devices immediately before energizing circuit.

.2 Ensure correct fuses fitted to physically matched mounting devices.

.1 Install rejection clips for Class R fuses.

.3 Ensure correct fuses fitted to assigned electrical circuit.

.4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.

.5 Install spare fuses in fuse storage cabinet.

## PART 1 - GENERAL

**1.1 Content of section**

.1 Material and equipment for disconnect switches and their installation.

**1.2 Related requirements**

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

**1.3 References**

.1 Canadian Standards Association (CSA International).
.1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.
.2 CSA C22.2 No.39-M89 (R2003), Fuseholder Assemblies.

**1.4 Action and informational submittals**

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

**1.5 Health and safety**

.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

**1.6 Waste management and disposal**

.1 Separate waste materials for reuse and recycling.

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

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.

.5 Fold up metal banding, flatten and place in designated area for recycling.

## PART 2 - PRODUCTS

**2.1 Disconnect switches**

.1 Fusible or non-fusible, horsepower rated disconnect switch in CSA Enclosure CSA, size as indicated.

.2 Provision for padlocking in on-off switch position by three (3) locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuses: size as indicated, in accordance with Section 26 28 13.01 - Fuses - Low Voltage.

.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 Acceptable manufacturer : Cutler-Hammer.

**2.2 Equipment identification**

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

## PART 3 - EXECUTION

**3.1 Installation**

.1 Install disconnect switches complete with fuses if applicable.

## PART 1 - GENERAL

### 1.1 References

.1 American National Standards Institute (ANSI)
- .1 ANSI C82.4-92, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers ( ANSI/IEEE )
- .1 ANSI/IEEE C62.41-1991, Surge Voltages in Low-Voltage AC Power Circuits.

.3 American Society for Testing and Materials (ASTM)
- .1 ASTM F 1137-88 (1993),Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 United States of America, Federal Communications Commission (FCC).
- .1 FCC (CFR47), EM and RF Interference Suppression.

.5 Canadian Standards Association (CSA International)

### 1.2 Related sections

.1 Section 01 33 00 – Submittal Procedures.

### 1.3 Shop drawings and date sheets

.1 Submit sheets and shop drawings in accordance with Section 01 33 00 - Documents and samples to be submitted.

.2 Submit complete photometric data of luminaires offered as determined by an independent testing laboratory and examined by the Engineer.

## PART 2 - PRODUCTS

### 2.1 Lamps

.1 Metal Halide Lamps
- .1 Identification of the lamp: L-1
- .2 Power: 1000 watts
- .3 Source: metal halide
- .4 Bulb Shape and Size: BT-56
- .5 Bulb Finish: clear

.6 Base: mogul
.7 Operating Position: vertical / base up
.8 Initial luminous flux: 110 000 lumens
.9 Life: 12 000 hours

2.2 Ballasts

.1 Ballasts for metal halide lamps.
- .1 Rated voltage: 347 V, 60 Hz, designed for a 1000 watts metal halide lamp.
- .2 Integrated into a housing and designed for use at an ambient temperature of 40 ° C.
- .3 Power factor: at least 95% at 95% of the nominal luminous flux of lamps.
- .4 Range of supply voltages: ± 10% of rated voltage.
- .5 Minimum starting temperature: minus 29 ° C at less than 90% of the rated supply voltage.
- .6 Installation: integrated to luminaire.
- .7 Peak value: maximum current 1.8; maximum voltage 2.0.
- .8 Connection block included.
- .9 5 year warranty on all electrical components.

2.3 Finish

.1 Ballast housing
- .1 EPA (Effective Projected Area): maximum of 2.5 square foot per fixture.
- .2 Approved for wet locations and CUL certified for operation at 40°C.
- .3 Made in die-cast aluminum.
- .4 Covered with a 2 to 4 mil layer of polyester powder paint with several levels of pretreatment.
- .5 Clip designed to hold a tenon of 2" nominal diameter (size 40) and allowing an adjustment of plus or minus 3 degrees for leveling.
- .6 Stainless steel lamp holder with braided fiber glass sleeve.

.2 Optical System
- .1 Spun aluminum reflector, polished and anodised.
- .2 Sag tempered glass lens.
- .3 Lamp for vertical / base up operating position to maximize its life and its luminous flux.
- .4 Enclosed luminaires minimizing any light above the horizontal, dust accumulation or reduction of its effectiveness.

.3 Photometry
- .1 Luminaire with a Type V "Cutoff" symmetrical distribution as per ANSI / IES.

.4 Product

.1 Luminaire as manufactured by Cooper Lighting Model HMX91M-W9DW, General Electric Model-HMAB-01MDA-1GMC5, HOLOPHANE HMSC10MH34C9 Model or approved equivalent.

2.4 Equipment Accessories

.1 CAD sulfite photocell for operation at 120 VAC, switching power of 1800 VA, plug-in type, built-in protection circuit 130 joule, blade switch, operating ratio (off / on) of 4 to 1, complete with base, as manufactured by INVENSYS / Paragon 300 Series or approved equivalent.

.2 Programmable electronic timer with 7 days/24 hours with 7 days backup (without battery), NEMA 1 enclosure, operating at 120 VAC, SPDT contact with a breaking capacity of 6A (inductive), as manufactured by INVESYS / Paragon Model EC4004 or approved equivalent.

.3 Light contactor to switch without a fuse, NEMA 1 enclosure, complete with fused control transformer 347/120 VAC, electro-mechanical relay with 30A switching capacity at 575 VAC with terminals suitable for wire gauge 6, surface mounted switch box of the type "MAN / OFF / AUTO", pilot lamps mounted on the cover, including their relays with LED bulbs, a green color bulb indicating that the control is on and an amber color bulb indicating that the switch is closed. Lighting control for metal halide source, according to CSA C22.2, No. 14, as manufactured by Rockwell Automation / Allen Bradley Bulletin 502L or approved equal.

2.5 Identification of contactor

.1 Contactor identified in accordance with Section 26 05 00 - Electrical - General Requirements for the results of the work.

.2 Format 4 nameplate with identification of circuit, panels and connected load.

## PART 3 - EXECUTION

3.1 Installation

.1 Install luminaires according to manufacturer's instructions.

.2 Install contactors and connect auxiliary command equipment.

## PART 1 - GENERAL

**1.1 Content of Section**

.1 Materials, lighting equipment and installation thereof.

**1.2 Related sections**

.1 Section 01 33 00 - Documents and samples to be submitted.

.2 Section 26 05 00 - Electrical - General requirements regarding the results of the work.

.3 Section 26 50 00 - Lighting equipment.

**1.3 References**

.1 Canadian Standards Association (CSA) / CSA International
- .1 CSA C22.2 No. 206-M1987 (C1999) Lighting poles.

.2 NEMASH5-1969 (R1974), Tubular Steel, Aluminum and Prestressed Concrete Roadway Lighting Poles.

**1.4 Documents and samples to be submitted**

.1 Submit data sheets required under Section 01 33 00 - Documents and samples to be submitted.

## PART 2 - PRODUCTS

**2.1 Steel poles**

.1 Steel poles according to CSA C22.2 No. 206 and NEMASH5, designed for underground power and having the following characteristics.
- .1 Height: 30 meters.

.2 Pole with anchor plate for mounting on concrete base.

.3 Eight steel anchor bolts 38Ø-6NC1A x 2050 x 175 mm with two flat washers, two nuts and locking nut compliant with CAN/CSA-G40.21M, nuance 350W.

.4 The bolts and the anchor plate to be concealed under a cover made of two basic parts which fit into each other around the pole and the anchor plate. The two parts of the base cover shall be attached to the anchor plate with vandal-resistant screws. This base cover also serves as protection against rodents.

.5 Round or 16 sides section tapered shaft made of three segments assembled by slip joint with a minimum wall thickness of 6 mm at the top.

.6 Three removable brackets at 120 degrees to support the mobile ring at 1.8 m above the concrete base when fully lowered.

.7 Access opening with welded frame. The opening should be large enough to allow easy access to components of the lifting system and electrical connections. The center of this opening is one meter above the anchor plate. The access opening is closed by a door with a handle at its center, two hinges and at least two vandal-resistant locking screws.

.8 A plate for mounting the winch and angles the safety chains and terminal grounding are welded inside the pole shaft and in line with the access opening.

.9 A plate or tenon is welded to the top of the shaft to install the lowering device.

.10 Finish. The pole shaft and its components are hot-dip galvanized according to CSA G164M while the section of the anchor bolts exposed to the air, the nuts and washers shall be galvanized to ASTM A513 S.I.C.

.11 All parts mentioned above must be made of steel conform to CSA G40.21 or ASTM A-572. The steel of the pole shaft shall have a silicon content controlled to 0.06% at most. The welds shall conform to CSA W59.1 and CSA W47.1.

2.2 Lifting and lowering devices

.1 The pole and the lifting and lowering device of the luminaires are designed and manufactured and tested as an integrated system. They are provided and guaranteed by a single manufacturer.

.2 Specifications

.1 The lifting and lowering device consists of three assemblies: a head frame, a mobile ring and a lifting system. All materials used in the manufacture of the device are corrosion resistant such as stainless steel, galvanized steel, aluminum or other specified materials. The system will be factory pre-wired and tested.

2.3 Head frame

.1 The head frame is welded and hot dip galvanized after fabrication. All hardware is stainless steel. The framework comprises three groups of two pulleys at 120 degrees for hoisting cables. Each pulley has a minimum of six inches in diameter and a groove is machined to accept the diameter of the hoisting cables. Each pulley is fitted with an oil-impregnated bronze sleeve.

Pulleys are zinc plated steel as per ASTM A63 and are coated with a yellow chromate finish. The pulleys are in compliance with the Wire Rope Technical Board. The hoisting cables are made of galvanized steel or stainless steel aircraft type 7 X 19, with a diameter of 3 / 16 "(8 mm) and conform to MIL Spec W83240C and Federal Specification RR-W-410D.

.2 The power cable is supported by a set of rollers that provide a minimum bend radius of 178 mm. Guides are provided to prevent the power cable out of the groove rollers.

.3 The head frame also includes three locking and supporting tubes made of high strength cast aluminum or hot dip galvanized steel. The locking and supporting tubes and the head frame must be designed not to be affected by environmental conditions such as ice, snow or rain.

.4 The locking and supporting tubes have to support the mobile ring in the engaged position when the hoisting cables are not used by the lifting mechanism. Each of the three tubes separately must be capable of supporting the full weight of the mobile ring, tenons and fixtures. Each tube is equipped with indicators that show the sequence of engagement and disengagement of the supporting rods. These indicators are visible to the naked eye from the ground. They must indicate that the mobile ring and its load are well locked and supported by the head frame and the post.

2.4 Mobile

.1 The mobile ring is made of # 7 gauge steel with a galvanized

ring finish. It also includes eight removable tenons to support the luminaires. The removable tenons are made of steel pipe 2 inches IPS 40 gauge x 1 meter long to withstand the specified fixtures. Each tenon is welded to a mounting plate that allows bolting to a mounting plate of the mobile ring. Ring, tenons and mounting plates are hot dip galvanized steel while the bolts are in stainless steel.

.2 Three stainless steel supporting rods are installed on the mobile ring and each is capable of supporting the total weight of the ring, tenons and luminaires. The process of engagement should be done even if the ring is out of normal adjustment.

.3 The inside of the mobile ring must be covered with a material that does not leave marks on the pole shaft during lowering or lifting process.

.4 The mobile ring is fitted with a NEMA 4 aluminum junction box for the main power distribution on the ring. One 600V terminal and a grounding bar to power the luminaires are included in the junction box. It also includes a grounded weatherproof outlet for checking luminaires and lamps when the mobile ring is lowered for ground maintenance. This box is pre-wired at the factory with the appropriate amount of type SOW 3 # 12 cord and main power cable type SOOW 5 # 10.

2.5 Spreader

.1 The spreader is a triangular, rectangular or another shape galvanized steel plate that allows you to attach more cables or conductors in a single attachment point. The spreader is a transition plate designed to ensure the alignment of the hoisting and power cables and avoid revolving of the cables under tension. All hoisting cables are attached to this transition galvanized steel plate with the appropriate hardware. The set of steel cables, hardware and components of the structure are designed to provide a safety factor of 5.

2.6 Winch

.1 The winch and its components have a safety factor of 5 times the weight lifting. The winch has a gear reduction of 30:1 and an integrated brake to prevent unwinding of the drum. The drum is supported on each side and has a stainless steel winding guide. The winch is equipped with a galvanized or stainless steel cable having a diameter of ¼ "(6 mm) 7 x 19 type aircraft installed at the factory. A NEMA 4 box contains the power circuit breaker and is installed on the mounting plate of the winch at the base of the pole. Conductors from underground conduits feed this box.

.2 A cable with a minimum length of 10ft. (3500 mm) and the appropriate plug is connected to the junction box located at the

base of the pole shaft. Cable and plug are the same type as the ones in the pole shaft and the junction box on the mobile ring.

2.7 Portable Power unit

.1 The power unit adapts to the winch and is equipped with a 1 HP minimum heavy-duty electric motor with reversible rotation and at least twice the force that required to operate the lowering mechanism. A moment limiter is used to limit the force applied to the lifting cables and winch. The adjustment must be made at the factory. The power unit is provided with a pin designed to cut at a moment between 50% and 100% above the limiter.

.2 A 20-foot cord with control box with push buttons is provided to operate the power unit at a safe distance from the pole. A transformer suitable for operating the electric motor at 120V must be included with the power unit.

2.8 Product

.1 HOLOPHANE: pole, mobile ring and lifting system model No. 08-01-08-HC-1M-J-100-C and portable power unit model No. LDM-1-4-600-30 or approved equivalent.

.2 FERALUX: pole and lifting system CMT-30,5-MTQ-E-R1 and mobile ring model CMC-30,5-MTQ-8-01or approved equivalent. Contact the manufacturer to get the catalog number of the motor unit.

.3 METAL POLE-LITE: Contact the manufacturer for catalog numbers.

## PART 3 - EXECUTION

3.1 Installation

.1 Install poles as directed by the manufacturer so that they are straight and plumb vertically.

.2 Install luminaires on the mobile ring tenons and screw the lamps in the luminaires.

.3 Check alignment, rotation, orientation and tilt of the luminaires.

.4 Connect the luminaires to the power supply circuit.

.5 Perform required tests in accordance with Section 26 05 00 - Electrical - General requirements regarding the results of the work.

Qualitas

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Le 2 septembre 2011

Monsieur Denis Thivierge, ingénieur
**Cima+**
740, rue Notre-Dame Ouest
Bureau 900
Montréal (Québec)
H3C 3X6

Dossier no : 16843-G

Sujet : **Étude géotechnique**
Remplacement de mâts d'éclairage
Centre régional de réception – Service correctionnel Canada
246, montée Gagnon
Sainte-Anne-des-Plaines (Québec)

Monsieur,

Il nous fait plaisir de vous transmettre les résultats de l'étude géotechnique que vous nous avez confiée.

Tous les travaux sur le site et en laboratoire ont été effectués sous la supervision de Madame Fatima Gabriel, ingénieure. Madame Hélène Bilodeau, ingénieure, a préparé le présent rapport, qui a été vérifié par le soussigné.

Nous espérons que ce rapport sera à votre entière satisfaction. N'hésitez pas à communiquer avec nous si vous désirez des renseignements supplémentaires.

**GROUPE QUALITAS INC.**

Renald Blanchet, ingénieur, M.Sc.
Directeur - Géotechnique
*N° de membre de l'OIQ : 24664*

HB/nc

2cc/ Cima+

## TABLE DES MATIÈRES



Liste des annexes

## 1.0 INTRODUCTION

Les services professionnels de Groupe Qualitas inc. (Qualitas) ont été retenus par Cima+ pour effectuer une étude géotechnique dans le cadre d'un projet de remplacement de mâts d'éclairage situés dans la cour intérieure du Centre régional de réception du Service correctionnel Canada. Ce bâtiment est situé au 246, montée Gagnon, à Sainte-Anne-des-Plaines (Québec).

Le but de l'étude géotechnique est de déterminer la nature et la capacité portante des sols en place, renseignements nécessaires à la conception des fondations des futurs mâts d'éclairage et à la formulation des recommandations d'ordre géotechnique qui en découlent.

La caractérisation environnementale des sols et de l'eau souterraine ne fait pas partie du présent mandat. En conséquence, les descriptions du terrain fournies dans le cadre de cette étude ne sont valables que du point de vue géotechnique, soit exclusivement pour la conception et la construction des ouvrages de génie civil, et n'ont aucunement la prétention de conclure sur la présence ou l'absence de matières toxiques ou contaminantes sur le site.

Les résultats des travaux réalisés sur le site et en laboratoire ainsi que nos conclusions et recommandations sont présentés dans ce rapport.

## 2.0 TRAVAUX RÉALISÉS

### 2.1 Travaux sur le site

Les travaux sur le site ont été réalisés du 16 au 18 août 2011. Le personnel de Qualitas a implanté sur le site les trois forages, tel que prévu dans notre offre de service datée du 5 juillet 2011. Le dessin 16843, présenté à l'annexe D, montre la position des forages réalisés dans le cadre du présent mandat.

Toutes les élévations indiquées dans le présent rapport se réfèrent au même niveau de base. Le repère de nivellement utilisé, dont l'élévation arbitraire a été fixée à 100,00 mètres, correspond au dessus de la base du mât d'éclairage existant situé à proximité du forage F-02. La position approximative de ce repère est indiquée sur le dessin 16843 présenté à l'annexe D.

Les forages F-01 à F-03 ont été réalisés à l'aide d'une foreuse à tarière évidée de type « CME 55 ». Ils ont atteint des profondeurs comprises entre 9,73 et 10,13 mètres sous la surface actuelle du terrain.

Un carottier fendu standard de calibre « B » a servi au prélèvement d'échantillons remaniés et à la mesure de l'indice « N » de l'essai de pénétration standard. Cet indice permet l'estimation de la compacité des matériaux granulaires traversés.

Des mesures de la résistance au cisaillement non drainé des sols argileux ont été réalisées à l'aide d'un scissomètre à déformation contrôlée de type « Nilcon » entre 1,53 et 10,13 mètres de profondeur dans les forages F-01 à F-03.

Les rapports de forages et des essais au scissomètre de terrain fournis sur les planches A-1 à A-6 de l'annexe A présentent tous les renseignements recueillis sur le site.

### 2.2 Travaux de laboratoire

Tous les échantillons récupérés ont été transportés à notre laboratoire de Longueuil où ils ont été identifiés par un examen visuel.

Deux échantillons de sols jugés représentatifs ont été soumis à un essai de détermination des limites de consistance. Les résultats des essais sont présentés en détail sur les planches B-1 et B-2 de l'annexe B et sont reportés sur les rapports de forages correspondants de l'annexe A.

Les échantillons non utilisés pour les essais de laboratoire seront conservés pendant une période de six mois suivant la date d'émission du présent rapport. Ils seront par la suite détruits à moins d'avis contraire de votre part.

## 3.0 NATURE ET PROPRIÉTÉS DES SOLS

La description et les propriétés des sols présentées dans les paragraphes qui suivent ainsi que sur nos rapports de forages ne sont garanties qu'à l'endroit où ils ont été réalisés. Par conséquent, les conclusions et recommandations basées sur ces informations sont soumises à cette limitation. Les conditions rencontrées entre les forages ou ailleurs sur le site peuvent différer de celles observées dans les forages. Qualitas devra être avisé promptement de tout écart décelé entre les matériaux décrits dans le présent rapport et ceux rencontrés lors des travaux d'excavation.

Les forages ont permis d'établir à leur emplacement la stratigraphie résumée dans les paragraphes suivants.

### 3.1 Remblai

Directement en surface du terrain, le forage F-01 a traversé une mince couche de remblai de sable brun, un peu de silt. Cette couche a une épaisseur de 80 millimètres.

### 3.2 Terre végétale

Sous la mince couche de remblai de sable au droit du forage F-01 et en surface du terrain au droit des forages F-02 et F-03, on retrouve une couche de terre végétale argileuse de couleur brune à gris-brun.

Cette couche de terre végétale a été traversée sur des épaisseurs comprises entre 0,19 et 0,54 mètre dans l'ensemble des forages.

### 3.3 Argile silteuse

Sous la terre végétale, les forages F-01 à F-03 ont pénétré un dépôt d'argile silteuse grise.

Selon les valeurs de résistance au cisaillement non drainé variant de 33 à 94 kPa, mesurées entre 1,53 et 10,13 mètres de profondeur dans les forages F-01 à F-03, la consistance du dépôt d'argile silteuse est généralement ferme, raide en surface du dépôt et localement sous 7,0 mètres de profondeur.

Les limites de plasticité et de liquidité (planches B-1 et B-2 de l'annexe B) ont été mesurées sur les échantillons d'argile silteuse CF-03 et CF-04, prélevés entre 1,22 et 3,66 mètres de profondeur dans le forage F-01. Les limites de liquidité obtenues sont de 70 et 69 pour cent et les limites de plasticité sont de 23 et 24 pour cent, d'où des indices de plasticité de 47 et 45 pour cent. Les indices de liquidité correspondants sont de 0,61 et 1,03.

Selon la *classification unifiée des sols*, le dépôt d'argile silteuse de plasticité élevée est considérée comme « CH ».

En se basant sur la relation proposée par Leroueil et al[1], la pression de préconsolidation ($\sigma'_p$) peut être estimée en fonction de la résistance au cisaillement non drainé mesurée au scissomètre « Nilcon » et des limites d'Atterberg. En tenant compte des poids volumiques des sols en place et d'une profondeur de la nappe d'eau à 2,0 mètres, l'écart de préconsolidation minimum de l'argile ($\sigma'_p - \sigma'_{vo}$) est d'environ 45 kPa à 9 mètres de profondeur.

Les forages F-01 à F-03 ont été interrompus dans le dépôt d'argile silteuse après l'avoir pénétré sur des épaisseurs comprises entre 9,51 et 9,84 mètres, soit jusqu'à des profondeurs variant de 9,73 à 10,13 mètres.

## 4.0 EAU SOUTERRAINE

Aucune mesure du niveau de l'eau souterraine n'a été relevée dans les forages F-01 à F-03. Toutefois, selon l'aspect des sols observés sur le site et en laboratoire (couleur, humidité, consistance), le niveau de la nappe d'eau souterraine semble se situer autour de 2,0 mètres de profondeur.

Nous désirons souligner que le niveau de l'eau souterraine peut varier suivant les précipitations et les saisons.

---

1 Leroueil, S., Tavenas, F., Le Bihan, J.-P., *Propriétés géotechniques des argiles de l'est du Canada.* Revue canadienne de géotechnique, vol. 20, no 4, novembre 1983, pp.681 à 705.

## 5.0 CONCLUSIONS ET RECOMMANDATIONS

Selon l'information reçue, le projet prévoit le remplacement de trois mâts d'éclairage situés dans la cour intérieure du Centre régional de réception du Service correctionnel Canada. Les localisations des nouveaux mâts d'éclairage sont indiquées par la positon des forages sur le dessin 16843 de l'annexe D.

Le niveau du terrain fini, après les travaux de remplacement des mâts d'éclairage, devrait être sensiblement le même que celui existant lors de la réalisation des forages. Selon l'information obtenue, la base des fondations des futurs mâts reposeront à une profondeur de 2,1 mètres sous la surface finie du terrain.

Selon l'information connue sur le projet et basé sur les renseignements obtenus au droit des forages, nos conclusions et recommandations sont émises dans les paragraphes qui suivent.

### 5.1 Capacités portantes aux états limites ultimes (ÉLU) et aux états limites de tenue en service (ÉLTS)

Sous une couche de terre végétale, le terrain naturel est constitué d'un dépôt d'argile silteuse de consistance ferme, localement raide. Notons qu'au droit du forage F-01, une mince couche de remblai de sable recouvre la terre végétale.

Des fondations conventionnelles isolées seront utilisées pour supporter la charge transmise par les mâts d'éclairage aux sols sous-jacents. Aucune fondation ne devra être appuyée sur ou au sein de matériaux de remblai, de sols contenant des matières organiques ou de sols remaniés.

D'après la stratigraphie des forages réalisés dans le secteur des futurs mâts, les fondations placées à 2,1 mètres sous le niveau du terrain fini reposeront sur le terrain naturel intact constitué du dépôt d'argile silteuse de consistance ferme.

Pour le dimensionnement des fondations isolées reposant sur le terrain naturel intact, nous recommandons de considérer les valeurs de capacité portante aux états limites de tenue en service (ÉLTS) présentées à la planche C-1 de l'annexe C. Ces valeurs de capacité portante sont valables pour des semelles de 0,80 à 6,00 mètres de largeur et ont été calculées en considérant un tassement maximal de 25 millimètres

Ces valeurs de capacité portante sont valables pour les charges mortes et vives permanentes.

Dans le cas de conditions extrêmes de chargement dues à l'application de charges transitoires, telles que des charges de vent ou tremblement de terre, la valeur de capacité portante à l'ÉLTS pourra être augmentée jusqu'à 50 pour cent de la capacité portante aux états limites ultimes (ÉLU) présentée ci-après. Dans ce cas, on devra s'assurer de maintenir une capacité portante à l'ÉLTS minimale correspondant à celles présentées au graphique de la planche C-1, pour la portion correspondant aux charges permanentes.

Les valeurs de capacité portante aux états limites de tenue en service (ÉLTS) sont valides exclusivement pour les conditions décrites aux paragraphes précédents. Si des modifications sont apportées à la conception des futurs mâts, ces capacités portantes à l'ÉLTS devront être réévaluées.

En assumant que les charges sont verticales et centrées sur la semelle, nous recommandons d'utiliser les valeurs de capacité portante aux états limites ultimes (ÉLU) données au tableau I pour la conception des semelles isolées reposant sur le dépôt d'argile silteuse de consistance ferme.

**TABLEAU I**

**CAPACITÉ PORTANTE À L'ÉLU**

| Largeur (mètres) | Capacité portante à l'ÉLU (kPa) Semelles carrées à 2,1 mètres de profondeur |
|---|---|
| 0,8 – 1,9 | 205 |
| 2,0 – 3,5 | 185 |
| 3,6 – 6,0 | 175 |

Un coefficient de tenue de 0,5 doit être appliqué à la capacité portante à l'ÉLU.

On devra prendre des précautions particulières pour éviter de remanier les sols argileux en place au niveau de la base des empattements. Ces précautions pourraient inclure l'utilisation d'un godet muni d'une lame et l'installation d'une plate-forme de travail constituée d'une couche de béton maigre dans le fond des excavations. On pourra aussi considérer la mise en place d'un coussin granulaire « MG-20 » de 300 millimètres d'épaisseur reposant sur une membrane géotextile. À cause de la présence d'argile, nous recommandons de limiter le compactage du coussin à 90 pour cent de la masse volumique maximale obtenue à l'essai Proctor modifié.

## 5.2 Protection contre le gel

Tous les empattements soumis aux effets du gel devront être enfouis à une profondeur minimale de 1,80 mètre sous la surface finale du terrain pour obtenir une protection efficace contre les méfaits du gel.

## 5.3 Excavation temporaire

Les pentes d'excavation temporaires requises pour fins de construction sont de la responsabilité de l'entrepreneur. Les pentes devront donc respecter les normes de la Commission de la santé et de la sécurité du travail (CSST) afin de réaliser les travaux de façon sécuritaire. Pour fins d'évaluation technique et économique, nous recommandons de considérer des pentes temporaires de 1,0 verticale pour 1,0 horizontale (1,0V:1,0H) dans les sols de surface (remblai et terre végétale) et le dépôt d'argile silteuse. Cette recommandation est valable pour des excavations de 2,5 mètres et moins.

Ces recommandations sont cependant soumises aux restrictions suivantes :

- aucune surcharge ou mise en tas au sommet de l'excavation à une distance de la crête du talus inférieure à la profondeur de l'excavation dans le mort-terrain;
- les sols présents à la surface de la pente seront protégés contre l'assèchement et l'érosion par les eaux de pluie et de ruissellement.

## 5.4 Drainage

Il est possible que des arrivées d'eau se produisent dans les excavations, selon les conditions climatiques qui prévaudront au moment des travaux. Les eaux de précipitation et de ruissellement devront être évacuées pour maintenir le fond des excavations à sec et éviter la formation de zones instables lors du compactage des matériaux d'assise et pendant le bétonnage des fondations.

Il sera de la responsabilité de l'entrepreneur de prévoir la ou les méthodes requises pour contrôler adéquatement les infiltrations d'eau dans les excavations.

## 6.0 CHANGEMENTS ET INSPECTIONS

Les conclusions et recommandations qui ont été formulées ne sont valides que pour les conditions décrites dans le présent rapport. Qualitas devra être avisé par écrit de tout changement dans la localisation, la nature ou la conception du projet afin d'en évaluer l'impact et, au besoin, de modifier par un document écrit les conclusions et recommandations formulées précédemment.

Nous espérons que ce rapport répond à vos besoins et nous vous prions de ne pas hésiter à communiquer avec nous pour tout renseignement additionnel.

**GROUPE QUALITAS INC.**

Hélène Bilodeau, ingénieure
Chargée de projet
*N° de membre de l'OIQ : 98989*

Renald Blanchet, ingénieur, M.Sc.
Directeur - Géotechnique
*N° de membre de l'OIQ : 24664*

HB/nc

2cc/ Cima+

## ANNEXE A

- **Rapports de forages et des essais au scissomètre de terrain (planches A-1 à A-6)**

## NOTES EXPLICATIVES SUR LES RAPPORTS DE FORAGE ET DE PUITS D'EXPLORATION

Les rapports de forage et de puits d'exploration placés en appendice contiennent une description détaillée des matériaux rencontrés, incluant la profondeur et l'élévation de chacune des couches rencontrées, et le type, la profondeur et la récupération de chacun des échantillons prélevés lors des travaux sur le terrain.

### DESCRIPTION DES SOLS

La description des sols est basée sur la classification selon la dimension des particules, l'importance relative de chaque constituants et les résultats des divers essais réalisés sur le terrain et en laboratoire.

#### Classification et dimension des particules

| Terminologie | Dimensions (mm) |
|---|---|
| Blocs | > 300 |
| Cailloux | 80 à 300 |
| Gravier | 5,0 à 80 |
| Sable | 0,080 à 5,0 |
| Silt | 0,002 à 0,80 |
| Argile | < 0,002 |

| | Proportion (en poids) |
|---|---|
| Traces | < 10% |
| Un peu | 10% à 20% |
| Adjectif (ex: silteux) | 20% à 35% |
| Nom (ex: et sable) | > 35% |

#### Sols pulvérulents

Dans le cas des sols pulvérulents (silt, sable et gravier), l'état de densité du sol, ou compacité, est exprimé par rapport à l'indice "N" de l'essai de pénétration standard.

| Compacité | Indice "N" |
|---|---|
| Très lâche | < 4 |
| Lâche | 4 à 10 |
| Compact ou moyenne | 10 à 30 |
| Dense | 30 à 50 |
| Très dense | > 50 |

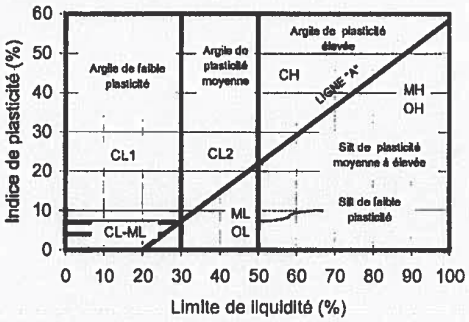
#### Sols cohérents

Pour les sols cohérents (argile), la consistance du matériau est évaluée à partir des essais de résistance au cisaillement ($c_u$) ou, à défaut, de l'indice "N". La sensibilité au remaniement ($S_t$) est définie par le rapport de la résistance au cisaillement du matériau intact ($c_u$ sur celle du matériau remanié ($c_r$).

| Consistance | Résistance ($c_u$) (kPa) | Indice "N" |
|---|---|---|
| Très molle | < 12 | < 2 |
| Molle | 12 à 25 | 2 à 4 |
| Ferme | 25 à 50 | 4 à 8 |
| Raide | 50 à 100 | 8 à 15 |
| Très raide | 100 à 200 | 15 à 30 |
| Dure | > 200 | > 30 |

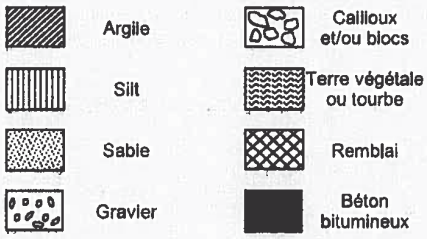
| Sensibilité ($S_t$) | $c_u$ / $c_r$ |
|---|---|
| Faible | < 10 |
| Moyenne | 10 à 40 |
| Élevée | > 40 |

### DIAGRAMME DE PLASTICITE



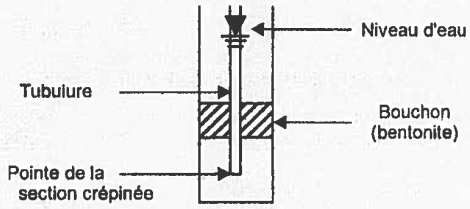

### STRATIGRAPHIE

Les symboles suivants sont utilisés, seuls ou associés avec d'autres, pour illustrer la stratigraphie observée.




### EAU

Dans cette colonne est indiqué le niveau de l'eau souterraine mesuré lors de travaux de reconnaissance ou ultérieurement. Les détails d'installation d'un piézomètre ou d'un tube d'observation sont illustrés sur la schéma suivant.




### ESSAIS

Dans cette colonne sont indiqués les résultats des essais réalisés aux profondeurs correspondantes, soit au chantier ou en laboratoire sur les échantillons récupérés dans les sondages.

| | | |
|---|---|---|
| Tx | : | Cisaillement en cellule triaxiale |
| Oed | : | Consolidation oedométrique |
| k | : | Perméabilité, en cm/s |
| AG | : | Analyse granulométrique |
| AC | : | Analyse chimique |

# NOTES EXPLICATIVES SUR LES RAPPORTS DE FORAGE ET DE PUITS D'EXPLORATION

## DESCRIPTION DU SOCLE ROCHEUX

La description du socle rocheux est le résultat de l'examen pétrographique des échantillons recueillis. Cet examen permet de décrire la couleur, la texture, le degré de fracturation et d'altération de la roche, l'épaisseur des lits et l'espacement des discontinuités. La résistance de la roche est évaluée à partir d'essais en compresion simple.

### Texture de la roche

| Terminologie | Dimension des grains (mm) |
|---|---|
| à gros grains | visibles à l'œil |
| à grains moyens | visibles à la loupe |
| à grains fins | non-visibles à la loupe |

### Degré de fracturation

Le degré de fracturation de la roche est exprimé par l'indice de qualité de la roche (RQD), tel que défini sur des carottes de calibre N. Il est le résultat de la sommation des longueurs d'échantillons de plus de 100 millimètres de longueur sur la longueur totale de la course.

| Terminologie | Indice RQD (%) |
|---|---|
| Très fracturé | < 25 % |
| Fracturé | 25 % à 50 % |
| Moyennement fracturé | 50 % à 75 % |
| Peu fracturé | 75 % à 90 % |
| Massif | > 90 % |

### Degré d'altération

| Terminologie | Description |
|---|---|
| Non altérée | Aucun signe d'altération |
| Légère | Altération légère sur les surfaces des joints |
| Moyenne | Altérée, mais non friable. La roche ne peut être brisée avec la main ou rayée avec une lame de canif. Texture intacte. |
| Élevée | Texture indistincte, mais orientation des grains intacte. La roche se brise avec effort avec la main ou se raye avec une lame de canif. |
| Complète | La roche se défait facilement. Structure et orientation des grains visible. |
| Sol résiduel | État avancé de décomposition donnant un sol plastique. Structure et orientation des grains détruites. |

### Epaisseur des lits

| Terminologie | Épaisseur (m) |
|---|---|
| Très épais | > 2 |
| Épais | 0,6 à 2,0 |
| Moyen | 0,2 à 0,6 |
| Mince | 0,06 à 0,2 |
| Très mince | 0,02 à 0,06 |
| Feuilleté | 0,006 à 0,02 |
| Finement feuilleté | < 0,006 |

### Espacement des discontinuités

| Terminologie | Espacement (m) |
|---|---|
| Très serrées | < 0,02 |
| Serrées | 0,02 à 0,06 |
| Rapprochées | 0,06 à 0,2 |
| Moyennement espacées | 0,2 à 0,6 |
| Espacées | 0,6 à 2,0 |
| Très espacées | 2 à 6 |
| Éloignées | > 6 |

### Résistance en compression de la roche

| Terminologie | Résistance (MPa) |
|---|---|
| Extrêmement faible | < 1 |
| Très faible | 1 à 5 |
| Faible | 5 à 25 |
| Moyenne | 25 à 50 |
| Forte | 50 à 100 |
| Très forte | 100 à 250 |
| Extrêmement forte | > 250 |

## STRATIGRAPHIE

Les symboles suivants sont utilisés, seuls ou associés avec d'autres, pour illustrer la stratigraphie observée.


Calcaire


Shale ou schiste argileux


Dolomie


Roche ignée


Grès


Roche métamorphique

Qualitas

# RAPPORT DE FORAGE

Planche A-1

DOSSIER : 16843-G
CLIENT : Cima +
PROJET : Remplacement de mâts d'éclairage
LOCAL : Centre régional de réception - Service correctionnel Canada
246, montée Gagnon, Sainte-Anne-des-Plaines (Québec)

Élev. surf. : 99,35 m (Arbitraire)

SONDAGE : F-01

Date : 2011-08-18
Technicien : A.B.
Fichier : F-01

| SYMBOLES STRATIGRAPHIQUES | NIVEAU D'EAU | | | TYPE ET ÉTAT DE L'ÉCHANTILLON | TYPE DE SONDAGE |
|---|---|---|---|---|---|
| Gravier, Remblai, Sable, Tourbe, Silt, Argile | Profondeur (m) Tube | Profondeur (m) Eau | Date aa-mm-jj | CF : Carottier fendu; Remanié; Perdu | Équipement : CME-55; Plongée : 90°; Direction : |

| PROF. (m) / ÉLÉVATION | DESCRIPTION STRATIGRAPHIQUE | Eau - Piezo | ÉCHANTILLONS Type Numéro | État | Rec. % | N ou RQD (%) | ESSAIS et NOTES | Cu Scissomètre (kPa) | Wp Wn WL |
|---|---|---|---|---|---|---|---|---|---|
| 0 / 99,27 | Remblai : Sable, un peu de silt (80 mm). Brun. Peu humide. | | CF-01 | | 69 | 4 | | | |
| 0,62 / 98,73 | Terre végétale argileuse. Brun-gris. Peu humide. | | CF-02 | | 89 | 12 | | | |
| | | | CF-03 | | 90 | | | | |
| | | | CF-04 | | 100 | | | | |
| | Argile siteuse. Grise. Humide. Consistance raide jusqu'à environ 2,0 mètres de profondeur puis ferme à raide par la suite. Plasticité élevée (CH). | | CF-05 | | 100 | | | | |
| | | | CF-06 | | 100 | | | | |
| | | | CF-07 | | 100 | | | | |
| 10,13 / 89,22 | Fin du forage à 10,13 mètres de profondeur. | | | | | | | | |

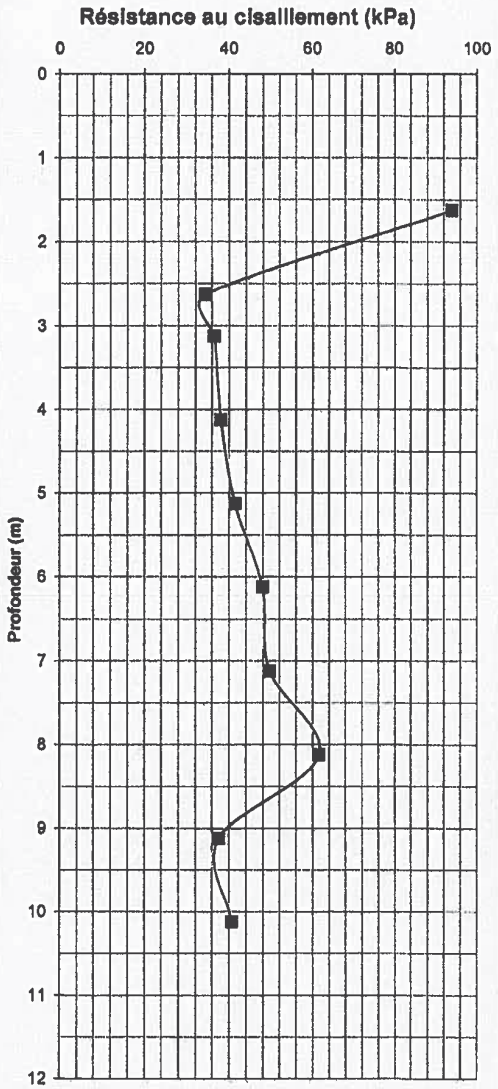
Qualitas

# ESSAI AU SCISSOMÈTRE DE CHANTIER

**(NQ 2501-200)**

| | | |
|---|---|---|
| Projet : Remplacement de mâts | N° Projet : 16843-G | Sondage N°: F-01 |
| Site : Sainte-Anne-des-Plaines | Inspecteur : A.B. | Date: 11-08-16 |
| Coordonnées | Appareil n°: U | Profondeur de l'argile (m) : 0.62 |
| Nord : | Constante "K" : 1.0471 | Profondeur de la nappe (m) : |
| Est : | Date de calibration : 11-03-11 | Autres : |
| Élévation : 99.35 m | par : Roctest | |

| Profondeur (m) | Ailettes | Résistance au cisaillement sol intact as-af (cm) | sol intact $c_u$ (kPa) | sol remanié as-af (cm) | sol remanié $c_{ur}$ (kPa) | Sensibilité $c_u/c_{ur}$ |
|---|---|---|---|---|---|---|
| 1.63 | M-4 | 9.00 | 94.0 | | | |
| 2.63 | M-4 | 3.30 | 34.5 | | | |
| 3.13 | G-1 | 6.70 | 36.6 | | | |
| 4.13 | G-1 | 7.00 | 38.2 | | | |
| 5.13 | G-1 | 7.60 | 41.5 | | | |
| 6.13 | G-1 | 8.80 | 48.0 | | | |
| 7.13 | G-1 | 9.10 | 49.7 | | | |
| 8.13 | M-4 | 5.90 | 61.6 | | | |
| 9.13 | M-4 | 3.60 | 37.6 | | | |
| 10.13 | M-4 | 3.90 | 40.8 | | | |




Profondeur du refus : m net ☐ progressif ☐

$c_u = K(as - af)/(101,972*C)$

as : distance radiale maximale du pointeur (cm)

af : distance radiale pendant la friction des tiges (cm)

| Ailettes | C |
|---|---|
| G-1 | 1.88E-03 |
| M-4 | 9.83E-04 |
| P | 5.00E-04 |

Remarques (description du site, difficultés de pénétration, opérations spéciales, etc.) :

Calculé par : F.Gabriel, ing. le: 11-09-06

Vérifié par : R.Blanchet, ing. le : 11-09-06

Qualitas

# RAPPORT DE FORAGE

Planche A-3

DOSSIER : 16843-G
CLIENT : Cima +
PROJET : Remplacement de mâts d'éclairage
LOCAL : Centre régional de réception - Service correctionnel Canada
246, montée Gagnon, Sainte-Anne-des-Plaines (Québec)
Élev. surf. : 99,13 m (Arbitraire)

SONDAGE : F-02
Date : 2011-08-17
Technicien : A.B.
Fichier : F-02

| SYMBOLES STRATIGRAPHIQUES | NIVEAU D'EAU | | | TYPE ET ÉTAT DE L'ÉCHANTILLON | | TYPE DE SONDAGE |
|---|---|---|---|---|---|---|
| Gravier, Tourbe, Sable, Silt, Argile | Profondeur (m) Tube | Profondeur (m) Eau | Date aa-mm-jj | CF : Carottier fendu | Remanié, Perdu | Équipement : CME-55<br>Plongée : 90°<br>Direction : |

| PROF. (m) / ÉLÉVATION | DESCRIPTION STRATIGRAPHIQUE | Eau - Piezo | ÉCHANTILLONS Type Numéro | État | Rec. % | N ou RQD (%) | ESSAIS et NOTES | Cu Scissomètre (kPa) 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|
| 0,22 / 98,91 | Terre végétale argileuse. Brune. Peu humide. | | CF-01 | | 75 | 11 | | |
| 1,29 / 97,84 | Argile silteuse. Brun-gris à grise. Peu humide. Consistance apparente raide. Fin de l'échantillonage, forage poursuivi par des essais scissométriques. | | CF-02 | | 79 | 7 | | |
| | Argile silteuse. Consistance raide jusqu'à environ 2,0 mètres devenant ferme à raide en profondeur. Essais scissométriques réalisés entre 1,73 et 9,73 mètres de profondeur. | | | | | | | |
| 9,73 / 89,40 | Fin du forage à 9,73 mètres de profondeur. | | | | | | | |

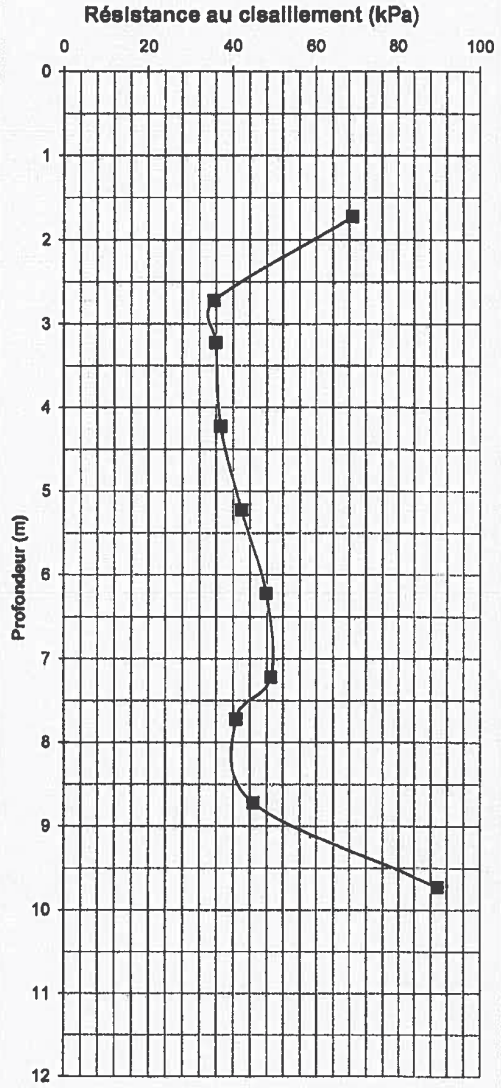
Qualitas

# ESSAI AU SCISSOMÈTRE DE CHANTIER

**(NQ 2501-200)**

| | | |
|---|---|---|
| Projet : Remplacement de mâts | N° Projet : 16843-G | Sondage N°: F-02 |
| Site : Sainte-Anne-des-Plaines | Inspecteur : A.B. | Date: 11-08-16 |
| Coordonnées | Appareil n°: U | Profondeur de l'argile (m) : 0.22 |
| Nord : | Constante "K" : 1.0471 | Profondeur de la nappe (m) : |
| Est : | Date de calibration : 11-03-11 | Autres : |
| Élévation : 99.13 m | par : Roctest | |

| Profondeur (m) | Ailettes | Résistance au cisaillement sol intact as-af (cm) | sol intact $c_u$ (kPa) | sol remanié as-af (cm) | sol remanié $c_{ur}$ (kPa) | Sensibilité $c_u/c_{ur}$ |
|---|---|---|---|---|---|---|
| 1.73 | M-4 | 6.60 | 69.0 | | | |
| 2.73 | M-4 | 3.40 | 35.5 | | | |
| 3.23 | G-1 | 6.60 | 36.0 | | | |
| 4.23 | G-1 | 6.80 | 37.1 | | | |
| 5.23 | G-1 | 7.70 | 42.0 | | | |
| 6.23 | G-1 | 8.80 | 48.0 | | | |
| 7.23 | G-1 | 9.00 | 49.1 | | | |
| 7.73 | M-4 | 3.90 | 40.8 | | | |
| 8.73 | M-4 | 4.30 | 44.9 | | | |
| 9.73 | M-4 | 8.60 | 89.9 | | | |




Profondeur du refus : m net ☐ progressif ☐

$c_u$ = K(as - af)/(101,972*C)

as : distance radiale maximale du pointeur (cm)

af : distance radiale pendant la friction des tiges (cm)

| Ailettes | C |
|---|---|
| G-1 | 1.88E-03 |
| M-4 | 9.83E-04 |
| P | 5.00E-04 |

Remarques (description du site, difficultés de pénétration, opérations spéciales, etc.) :

Calculé par : F.Gabriel, ing. le: 11-09-06

Vérifié par : R.Blanchet, ing. le : 11-09-06

Qualitas

# RAPPORT DE FORAGE

Planche A-5

DOSSIER : 16843-G
CLIENT : Cima +
PROJET : Remplacement de mâts d'éclairage
LOCAL : Centre régional de réception - Service correctionnel Canada
246, montée Gagnon, Sainte-Anne-des-Plaines (Québec)
Élev. surf. : 98,71 m (Arbitraire)

SONDAGE : F-03

Date : 2011-08-16
Technicien : A.B.
Fichier : F-03

| SYMBOLES STRATIGRAPHIQUES | NIVEAU D'EAU | | | TYPE ET ÉTAT DE L'ÉCHANTILLON | | TYPE DE SONDAGE |
|---|---|---|---|---|---|---|
| Gravier, Tourbe, Sable, Silt, Argile | Profondeur (m) Tube | Profondeur (m) Eau | Date aa-mm-jj | CF : Carottier fendu | Remanié, Perdu | Équipement : CME-55<br>Plongée : 90°<br>Direction : |

| PROF. (m) / ÉLÉVATION | DESCRIPTION STRATIGRAPHIQUE | Eau - Piezo | ÉCHANTILLONS Type Numéro | État | Rec. % | N ou RQD (%) | ESSAIS et NOTES | Cu Scissomètre (kPa) 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|
| 0 / 0,19 / 98,52 | Terre végétale argileuse. Brune. Peu humide. | | CF-01 | | 64 | 12 | | |
| 1 | | | CF-02 | | 85 | 8 | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | Argile siteuse. Grise. Humide. Consistance raide devenant ferme à raide à partir d'environ 2,0 mètres de profondeur. Essais scissométriques réalisés entre 1,53 et 10,03 mètres de profondeur. | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 / 10,03 / 88,68 | Fin du forage à 10,03 mètres de profondeur. | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |

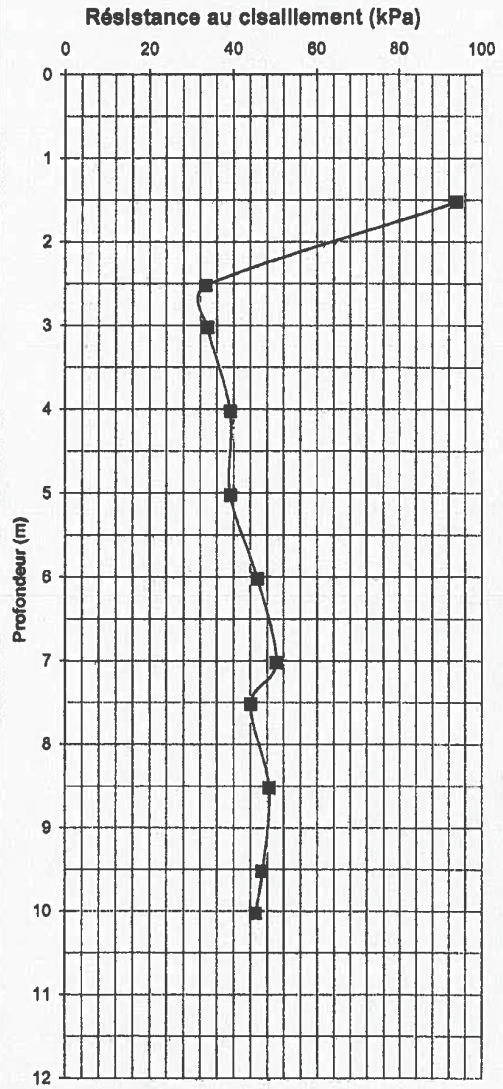
Qualitas

# ESSAI AU SCISSOMÈTRE DE CHANTIER

**(NQ 2501-200)**

| | | |
|---|---|---|
| Projet : Remplacement de mâts | N° Projet : 16843-G | Sondage N°: F-03 |
| Site : Sainte-Anne-des-Plaines | Inspecteur : A.B. | Date: 11-08-16 |
| Coordonnées | Appareil n°: U | Profondeur de l'argile (m) : 0.19 |
| Nord : | Constante "K" : 1.0471 | Profondeur de la nappe (m) : |
| Est : | Date de calibration : 11-03-11 | Autres : |
| Élévation : 98.71 m | par : Roctest | |

| Profondeur (m) | Ailettes | Résistance au cisaillement sol intact as-af (cm) | sol intact $c_u$ (kPa) | sol remanié as-af (cm) | sol remanié $c_{ur}$ (kPa) | Sensibilité $c_u/c_{ur}$ |
|---|---|---|---|---|---|---|
| 1.53 | M-4 | 9.00 | 94.0 | | | |
| 2.53 | M-4 | 3.20 | 33.4 | | | |
| 3.03 | G-1 | 6.20 | 33.8 | | | |
| 4.03 | G-1 | 7.20 | 39.3 | | | |
| 5.03 | G-1 | 7.20 | 39.3 | | | |
| 6.03 | G-1 | 8.40 | 45.9 | | | |
| 7.03 | G-1 | 9.20 | 50.2 | | | |
| 7.53 | G-1 | 8.10 | 44.2 | | | |
| 8.53 | G-1 | 8.90 | 48.6 | | | |
| 9.53 | G-1 | 8.60 | 46.9 | | | |
| 10.03 | G-1 | 8.30 | 45.3 | | | |




Profondeur du refus : m net ☐ progressif ☐

$c_u = K(as - af)/(101,972*C)$

as : distance radiale maximale du pointeur (cm)

af : distance radiale pendant la friction des tiges (cm)

| Ailettes | C |
|---|---|
| G-1 | 1.68E-03 |
| M-4 | 9.83E-04 |
| P | 5.00E-04 |

Remarques (description du site, difficultés de pénétration, opérations spéciales, etc.) :

Calculé par : F.Gabriel, ing. le: 11-09-06

Vérifié par : R.Blanchet, ing. le : 11-09-06

## ANNEXE B

- **Essais de laboratoire (planches B-1 et B-2)**

Qualitas

# LIMITES DE CONSISTANCE DES SOLS

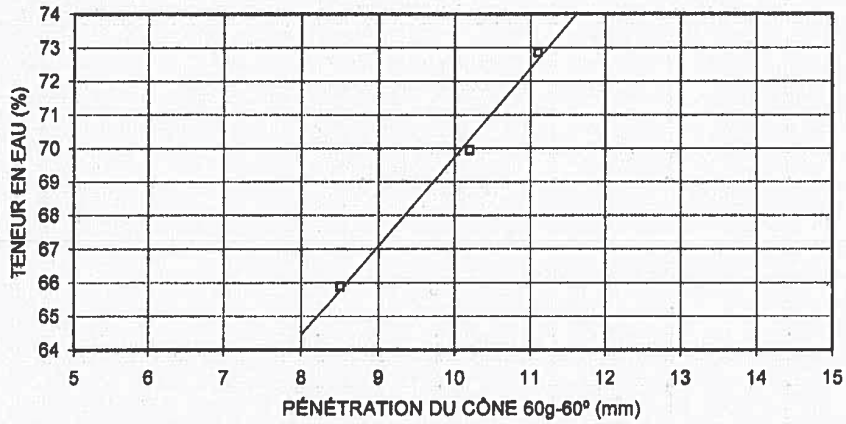
NQ 2501-092

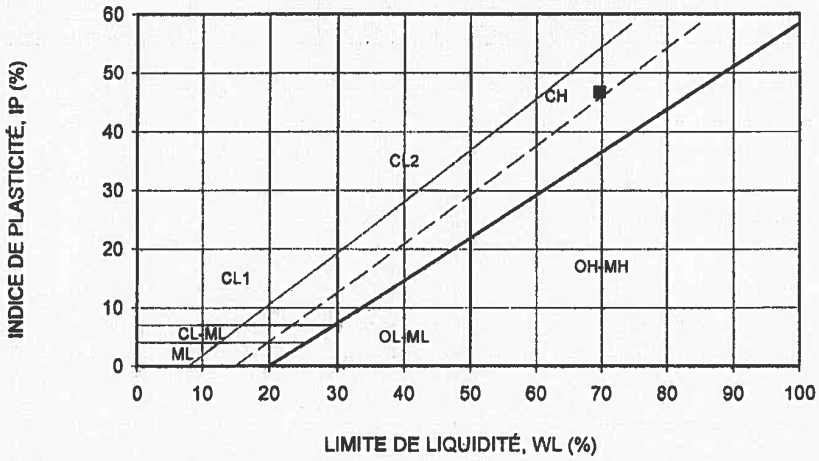
Planche B-1

| | | | |
|---|---|---|---|
| DOSSIER : | 16843-G | SONDAGE : | F-01 |
| CLIENT : | Cima + | ÉCHANT. : | CF-03 |
| PROJET : | Remplacement de mâts d'éclairage | PROF. (m) : | 1.22 - 1.83 |
| LOCALISATION: | 246, Montée Gagnon<br>Sainte-Anne-des-Plaines (Québec) | ÉCH. No : | 01-03 |
| | | FICHIER : | 01-03.LIM |

| MÉTHODE ET PRÉPARATION | | TENEURS EN EAU | NATURELLE | | | LIMITE DE PLASTICITÉ | | |
|---|---|---|---|---|---|---|---|---|
| Méthode : | Cône | Remarques | | | | | | |
| Séchage : | Aucun | Masse totale humide | 316.34 | | | 20.49 | 20.29 | |
| Tamisage : | Aucun | Masse totale sèche | 214.52 | | | 17.11 | 16.93 | |
| | | Tare no | Q-66 | | | 1 441 | 1 204 | |
| % < 5 mm : | | Masse de la tare | 16.99 | | | 2.41 | 2.36 | |
| % < 0.40 mm : | | Teneur en eau | 51.55 | | | 22.99 | 23.06 | |
| % < 0.08 mm : | | Valeurs moyennes | 51.55 | | | 23.03 | | |
| % < 0.002 mm : | | | | | | | | |

| LIMITE DE LIQUIDITÉ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Point no | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Remarque | | | | | | | | |
| Pénétration cône 60g-60° | 11.1 | 10.2 | 8.5 | | | | | |
| | | | | | | | | |
| Masse totale humide | 35.64 | 35.15 | 41.96 | | | | | |
| Masse totale sèche | 21.63 | 21.68 | 26.26 | | | | | |
| Tare no | 709 | 352 | 1251 | | | | | |
| Masse de la tare | 2.40 | 2.42 | 2.43 | | | | | |
| Teneur en eau | 72.85 | 69.94 | 65.88 | | | | | |




| RÉSULTATS D'ESSAIS | | |
|---|---|---|
| Teneur en eau naturelle : | | |
| Globale | $W_{NG}$ : | 51.5 |
| < | $W_{NL}$ : | 51.5 |
| Limite de liquidité : | | |
| Au cône | $W_{LC}$ : | 69.7 |
| Limite de plasticité : | | 23.0 |
| Indice de plasticité | | |
| Au cône | $I_{PC}$ : | 46.7 |
| Indice de liquidité | | |
| Au cône | $I_{LC}$ : | 0.61 |
| Activité (IP/2mm) | | |
| Au cône | $A_C$ : | |

| Classif. | USC | AASHO |
|---|---|---|
| Cône | CH | |

NP : Non plastique
ND : Non déterminé
EX : Exclus

Remarques:

Effectué par :
M.B.B. 2011-08-22

Vérifié par
Hélène Bilodeau, ing.

Date : 2011-08-24

Qualitas

# LIMITES DE CONSISTANCE DES SOLS

NQ 2501-092

Planche B-2

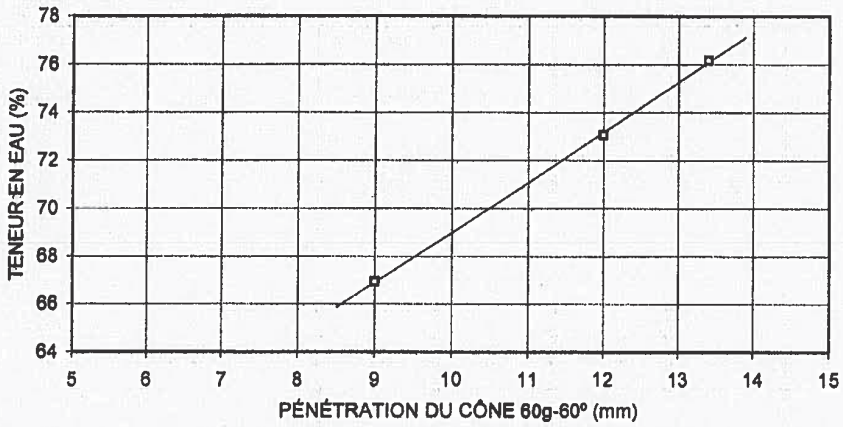
DOSSIER : 16843-G
CLIENT : Cima +
PROJET : Remplacement de mâts d'éclairage
LOCALISATION: 246, Montée Gagnon
Sainte-Anne-des-Plaines (Québec)

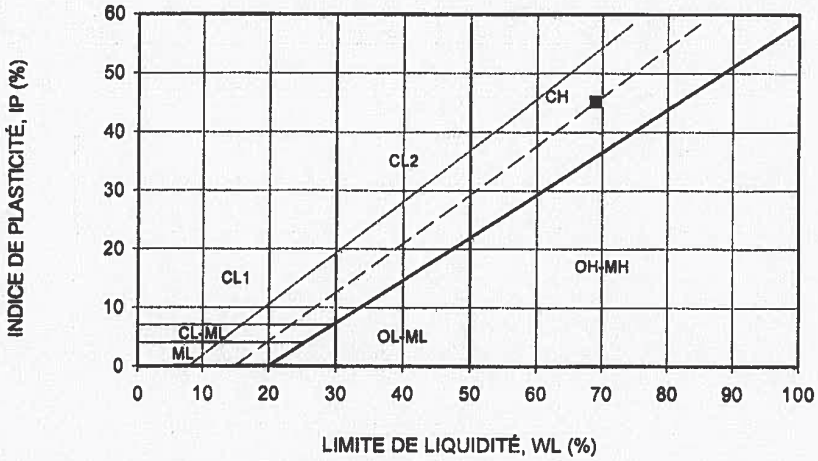
SONDAGE : F-01
ÉCHANT. : CF-04
PROF. (m) : 3.05 - 3.66

ÉCH. No : 01-04
FICHIER : 01-04.LIM

| MÉTHODE ET PRÉPARATION | | TENEURS EN EAU | NATURELLE | | | LIMITE DE PLASTICITÉ | | |
|---|---|---|---|---|---|---|---|---|
| Méthode : | Cône | Remarques | | | | | | |
| Séchage : | Aucun | Masse totale humide | 266.75 | | | 20.00 | 18.46 | |
| Tamisage : | Aucun | Masse totale sèche | 163.41 | | | 16.56 | 15.40 | |
| | | Tare no | Q-36 | | | 369 | 1 111 | |
| % < 5 mm : | | Masse de la tare | 16.94 | | | 2.38 | 2.39 | |
| % < 0.40 mm : | | Teneur en eau | 70.55 | | | 24.26 | 23.52 | |
| % < 0.08 mm : | | Valeurs moyennes | 70.55 | | | 23.89 | | |
| % < 0.002 mm : | | | | | | | | |

| LIMITE DE LIQUIDITÉ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Point no | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Remarque | | | | | | | | |
| Pénétration cône 60g-60° | 13.4 | 12.0 | 9.0 | | | | | |
| | | | | | | | | |
| Masse totale humide | 37.87 | 40.96 | 35.04 | | | | | |
| Masse totale sèche | 22.54 | 24.69 | 21.94 | | | | | |
| Tare no | 1262 | 391 | 224 | | | | | |
| Masse de la tare | 2.41 | 2.42 | 2.37 | | | | | |
| Teneur en eau | 76.15 | 73.06 | 66.94 | | | | | |




| RÉSULTATS D'ESSAIS | | |
|---|---|---|
| Teneur en eau naturelle : | | |
| Globale | $W_{NG}$ : | 70.6 |
| < | $W_{NL}$ : | 70.6 |
| Limite de liquidité : | | |
| Au cône | $W_{LC}$ : | 69.0 |
| Limite de plasticité : | | 23.9 |
| Indice de plasticité | | |
| Au cône | $I_{PC}$ : | 45.1 |
| Indice de liquidité | | |
| Au cône | $I_{LC}$ : | 1.03 |
| Activité (IP/2mm) | | |
| Au cône | $A_C$ : | |

| Classif. | USC | AASHO |
|---|---|---|
| Cône | CH | |

NP : Non plastique
ND : Non déterminé
EX : Exclus

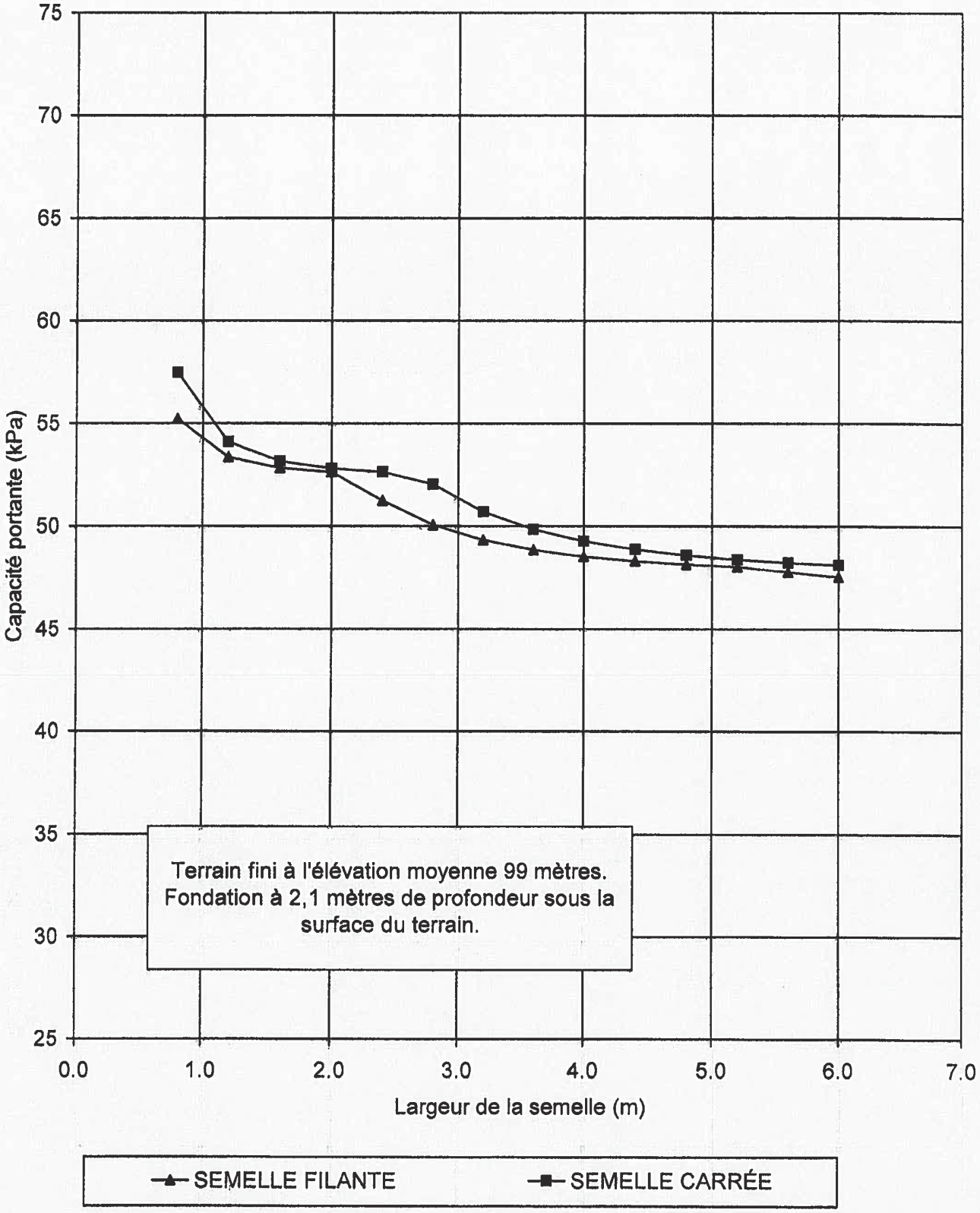
Remarques:

Effectué par :
M.B.B. 2011-08-22
Vérifié par
Hélène Bilodeau, ing.
Date : 2011-08-24

## ANNEXE C

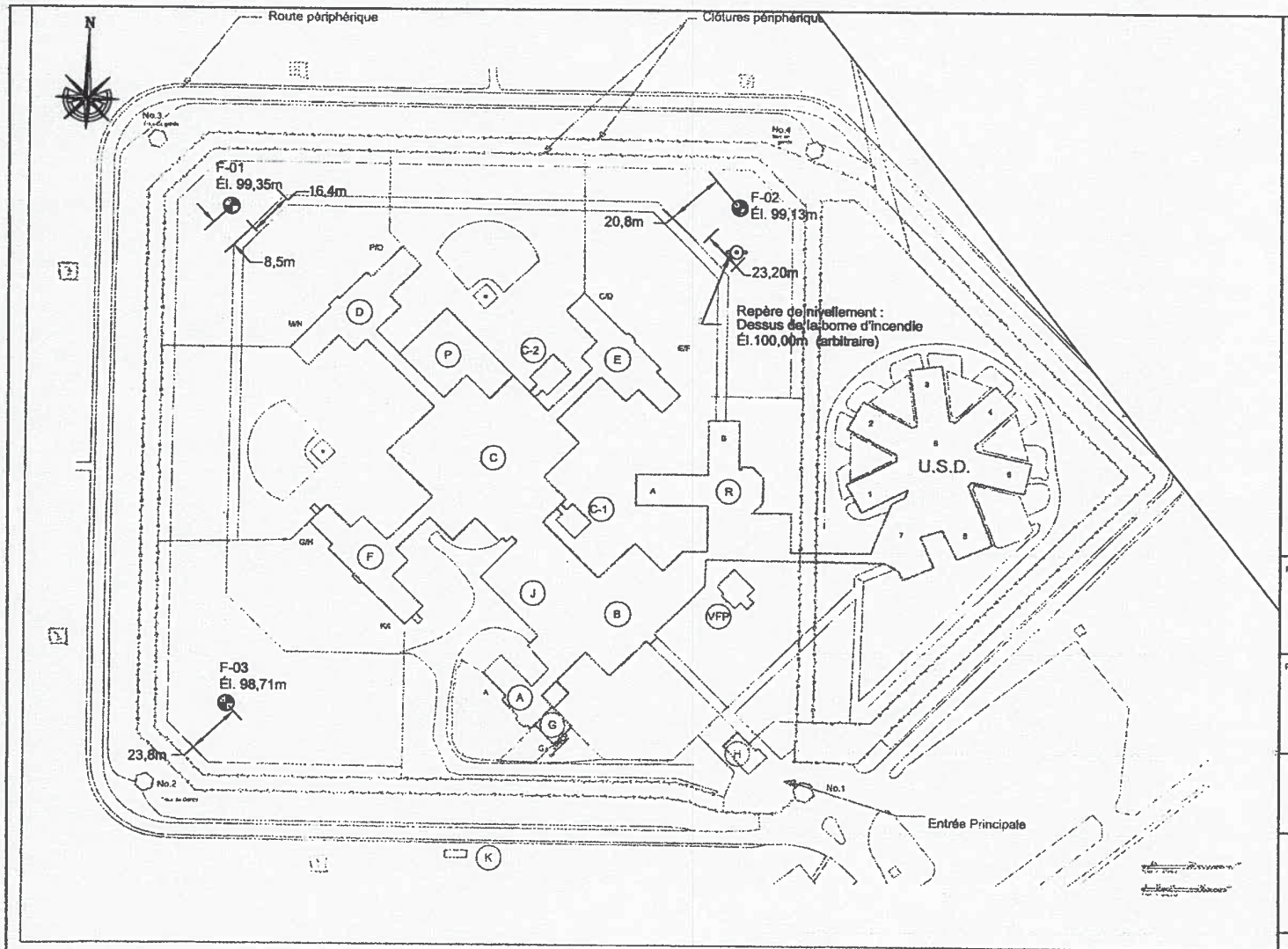
- **Graphique des capacités portantes à l'ÉLTS (planche C-1)**

# CAPACITÉ PORTANTE À L'ÉLTS



## ANNEXE D

- **Localisation des sondages (dessin 16843)**




**LÉGENDE**

F-01 Él. 99,35m — Forage, numéro et élévation

INGÉNIEUR Hélène Bilodeau 98989

2011/08/18

RÉFÉRENCE :

PROJET : Remplacement de mâts d'éclairage
Centre régional de réception
Service correctionnel Canada
246, Montée Gagnon,
Sainte-Anne-des-Plaines (Québec)

TITRE : Localisation des forages

Qualitas

| | | | |
|---|---|---|---|
| DESSINÉ : | R. M. | APPROUVÉ : | H. Bilodeau, ing. |
| DATE : | 2011-08-18 | ÉCHELLE : | Aucune |
| DOSSIER : | 16843-G | DESSIN : | 16843 |

Partners in excellence

# STE-ANNE-DES-PLAINES INSTITUTION

# COURTYARD LIGHTING UPGRADES

## STRUCTURAL SPECIFICATION

**ISSUED FOR TENDER**

Prepared by : _____
Alexandre Poulin, jr Eng.

Verified by : _____
Michel R. Hudon, Eng. B.arch.

PROJECT N° : 550-2-343-3920
Ref. Cima+ : M02146A
September 6th, 2013

740 Notre-Dame Street West., Suite 900
Montreal QC H3C 3X6
CANADA

**Phone : 514-337-2462**
Fax : 514-281-1632
**www.cima.ca**

ISO 9001

BEST MANAGED COMPANIES

## PART 1 - GENERAL

### 1.1 Scope of Work

.1 The work in this section included provision of all material, services, labour and transport necessary to complete all formworks.

.1 Design, construct, supply accessories, assemble, dismantle and provide all formwork and scaffolding required for the execution of works shown on the drawings or as specified;

.2 Supply and installation of all temporary supports as specified on formwork drawings;

.3 Supply and installation of all devices required for the formworks;

.4 Installation of anchor bolts.

.5 Supply and install of all sleeves in formworks as required by the mechanical drawings.

### 1.2 Related Work

| | | |
|---|---|---|
| .1 | Concrete reinforcement | Section 03 20 00 |
| .2 | Cast-in-place concrete | Section 03 30 00 |

### 1.3 Reference Standards

.1 Construct concrete formwork in accordance with CAN3-A23.1 and A23.3, except where specified otherwise.

.2 Construct falsework in accordance with CSA S269.1, except where specified otherwise.

.3 The following standards and rules are to be considered as part of this specification section:

CSA A23.3: Standards for reinforced and unreinforced concrete design;

National Building Code;

Safety Code for Construction Works;

ACI-347-68 : Recommended Practice for Concrete Formwork.

## PART 2 - PRODUCTS

### 2.1 Materials

.1 Formwork lumber: plywood and wood formwork materials to meet with CAN3-A23.1.

Non exposed surfaces can be formed with prefabricated panels.

.2 Falsework materials: to meet with CSA S269.1 table 1. Materials shall be identified with a quality index or provided with certificates, test reports or other conformity assessment.

.3 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.

.4 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surfaces.

## PART 3 - EXECUTION

### 3.1 Construction

.1 Verify lines, levels and column centres before proceeding with formworks. Make sure that dimensions are in accordance with drawings.

.2 Construct forms to produce finished concrete that meet shapes, dimensions, locations and levels indicated and so within tolerances required by CAN3-A23.1.

.3 Construct falseworks in accordance with CSA S269.1.

.4 Align form joints and make them watertight. Keep form joints to minimum.

.5 Grooves, slots, mortises, openings, drip mouldings, expansion and construction joints shall be in accordance with drawings.

.6 Maintain formworks in place for following minimum periods of time after pouring concrete.
.1 Two (2) days for footings.

.7 Re-use of formwork and falsework subject to requirements of CAN3-A23.1.

.8 Formwork shoring and bracing shall be in accordance with the Safety Code for Construction Works.

.9 Anchor rods shall be positioned with wooden templates before the pouring of concrete.

### 3.2 Inspection

.1 Ensure that formworks are constructed in accordance with all applicable codes, regulations, standards and original design. Inform the Engineer if not so.

### 3.3 Formwork Installation

.1 Formworks shall be installed in accordance with the Safety Code for Construction Works.

### 3.4 Ouvertures, manchons

.1 See information prescribed in electrical specifications.

- END OF SECTION -

## PART 1 - GENERAL

**1.1 Scope of work**

.1 Provide, transport, store and install reinforcing steel as specified on drawings, bar lists, as required by the Engineer.

**1.2 Related Works**

.1 Formwork and falsework — Section 03 10 00

.2 Cast-in-place concrete — Section 03 30 00

**1.3 Reference Standards**

.1 Except when specified otherwise, the latest standards shall apply.

.2 Reinforcing steel fabrication and installation shall be made in accordance with the followings standards and regulations:

- CSA A23.1 : Concrete materials and methods of concrete construction
- CSA A23.3 : Latest edition. Design of concrete structures.
- CSA G30.18 : Carbon steel bars for concrete reinforcement
- CSA G30.15 : Latest edition. Welded Deformed Steel Wire Fabric for Concrete Reinforcement

**1.4 Quality Source Control**

.1 Upon request, provide Engineer with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis minimum 5 weeks prior to commencing reinforcing installation.

**1.5 Shop Drawings**

.1 Submit shop drawings according to the specifications of the general conditions and of the complementary general conditions.

.2 Indicate bar sizes, spacing, location and quantities of reinforcement, mesh, mechanical splices, chairs, spacers and hangers with identifying code marks to permit accurate placement without having to refer to structural drawings as per (ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures).

.3 Design and detail lap lengths and bar development lengths to CSA CAN3-A23.3, unless otherwise indicated.

.4 Except where noted otherwise, lap splice lengths shall be Class B (tension) except for columns.

.5 The detailed drawings shall correspond with concrete pouring sequences shown on the design drawings issued for construction.

.6 Submit these transmittals for engineer's approval while respecting the shop drawings' specifications.

1.6 Substitutes

.1 Substitution of bar sizes permitted only upon written approval of Engineer.

## PART 2 - PRODUCTS

### 2.1 Materials

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

.2 Chairs, bolsters, bar supports, spacers: to CAN3-A23.1. Use of wood blocks not allowed.

## PART 3 - EXECUTION

### 3.1 Preliminary Verification

.1 Ensure that reinforcing steel is installed in accordance with codes, regulation and the original design. Otherwise advise the Engineer immediately.

### 3.2 Fabrication

.1 Fabricate reinforcing steel in accordance with CAN3- A23.1.

.2 Cut and bend reinforcing steel in accordance with dimensions and radius shown on design and shop drawings or as required by the Engineer.

.3 Reinforcing steel shall be cold bended so not to alter steel strength.

.4 Obtain Engineer's approval for locations of reinforcement splices other than shown on steel placing drawings.

.5 Ship bundles of bar reinforcement clearly identified in accordance with bar lists.

.6 For reinforcing steel that requires to be welded, use weldable grade steel.

### 3.3 Field Bending

.1 Do not bend reinforcement on site except if indicated or authorized by Engineer.

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

.3 Replace steel bars that show cracks or splits.

### 3.4 Placing Reinforcement

.1 Place reinforcing steel as indicated on approved shop drawings and in accordance with CAN3-A23.1.

.2 For the installation of reinforcing steel use support chair only to support or space steel.

.3 Mix lap locations and do not lap where stressed are maximum.

.4 Minimum spacing of steel to be larger than 1.5 times diameter of bars, 1.5 times maximum aggregate size and larger than 25 mm.

.5 Steel to be tied to prevent displacement during concrete pouring.

.6 Except where noted otherwise on plans and specifications, reinforcing steel must respect the concrete covers specified in the A23.1 standard.

.7 Except if permitted, steel shall not be bent while buried in concrete.

.8 Tolerances shall be in accordance with article 12.8 of CSA A23.1.

3.5 Inspection

.1 Advise Engineer 24 hours prior to concrete pouring. Obtain Engineer's approval before pouring concrete.

3.6 Related Items

.1 Supply and install all related items including chairs, spacers, hangers, etc.

.2 Chairs to be used in beams, slabs and also walls and pilasters.

- END OF SECTION -

## PART 1 - GENERAL

### 1.1 Scope of Work

.1 The work covered by this specification includes the provision of all labour, material, equipment and services required for the installation of all plain and reinforced concrete and related items as shown on the drawings and as specified herein and including:

- Supply and placing of concrete;
- Concrete finishing;

.2 Refer also to the electrical plans and specifications for the positioning and construction of the lamp post bases.

.3 Execute all necessary works to concrete pouring in accordance with drawings or as required by the Engineer.

### 1.2 Related Work

| | | |
|---|---|---|
| .1 | Formwork and falsework | Section 03 10 00 |
| .2 | Concrete reinforcement | Section 03 20 00 |

### 1.3 Reference Standards

.1 Except as otherwise specified, the latest standards shall applied.

.2 Execute cast-in-place concrete works in accordance with CAN3-A23.1, and testing in accordance with CAN3-A23.2, except where specified otherwise.

### 1.4 Quality control

.1 Submit the proposed quality control methods for engineer's approval.

## PART 2 - PRODUCTS

### 2.1 Materials

.1 Portland cement: to CAN3-A5.

.2 Aggregates: to CAN3-A23.1. Coarse aggregates to be normal density.

.3 Chemical admixtures: to CAN3-A266.2.

.4 Pozzolanic mineral admixtures: to CAN3-A23.5.

### 2.2 Concrete mixes

.1 Proportion normal density concrete in accordance with article 14 of CAN3-A23.1, to give following properties:

28 days compressive strength: 30 MPa

.2 Cement to be Portland type 10.

.3 If required in specs or permitted by the Engineer, admixtures shall be in accordance with the followings:

.1 Entrained air: “Specification for Entraining Admixtures for Concrete” (ASTM C-260).

.2 Admixtures: “Temptative Specifications for Chemicals Admixtures for Concrete” (ASTM C-494).

.4 Aggregates shall be in accordance with “Specifications for Concrete Aggregates” (ASTM C-33).

.5 Fine and coarse aggregates shall be considered separately. Each type must met ASTM specifications granulometry.

.6 Fine aggregate shall be made of natural sand or a combination of natural and manufactured sand.

.7 Concrete shall be so proportioned and mixed as to produce plastic workable mixture to meet all specification requirements, and suitable to the specific conditions of placement. Concrete shall be of a uniform texture, quality, colour and strength.

.8 Air contents: 6 to 8% for concrete exposed to weather and frost-thaw cycles.

.9 Maximum slump at point of discharge in accordance with “Method of Test for Slump of Portland Cement Concrete” (ASTM C-1343), is as specified on drawings.

.10 Coarse aggregate to be 20 mm maximum. Smaller 13 mm

coarse aggregate may be use with Engineer's approval.

.11 Calcium chloride prohibited.

.12 Slump of concrete shall be between 75 and 120 mm.

.13 Proportions of mixes shall be chosen to insure durability, strength, workability and other specifications as requested.

.14 Concrete mix shall be sufficiently workable to fill all corners and cover all reinforcing steel, without allowing for segregation of the materials or ponding on the surface.

.15 For each type of concrete the mix shall be approved by the testing laboratory of the Owner.

2.3 Mixing and handling

.1 All structural concrete used on site may be premixed in trucks, mixed on site or dry premixed.

.2 Concrete remaining in trucks more than 1-1/2 hour after water has been added, shall not be used.

.3 An official detailed form shall follow each concrete delivery.

.4 Water shall not be added to mix on delivery without the Engineer's approval or his representative.

.5 If water is added, concrete shall then be mixed for a maximum of 30 turns and shall be in accordance with slump air entrained and water/cement ratio specifications.

.6 It is forbidden to mix hardening concrete.

.7 The testing laboratory representative has the authority to stop concrete pouring when specifications are not met.

2.4 Temperature

.1 If temperature fall below 4$^{o}$ C or if the Engineer doubt that temperature may be below 4$^{o}$ C in the next 24 hours, water and aggregates shall be heated to maintain the concrete between 17$^{o}$ C and 32$^{o}$ C on concrete pouring.

.2 All measures shall be taken to protect concrete against freezing for at least 5 days. Those measures shall be in accordance with the "Recommended Practice for Cold Weather Concreting" (ACI 306).

## PART 3 - EXECUTION

### 3.1 General

.1 Obtain Engineer's approval before pouring concrete. Provide 24 h notice prior to placing of concrete.

.2 Cast concrete according to CAN3-A23.1.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to pouring concrete, obtain Engineer's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

### 3.2 Transport and placing of concrete

.1 Set all openings in formwork as required on structural, mechanical, electrical and architectural drawings. Correctly install reinforcing steel.

.2 Engineer shall be advised 24 hours before any concrete pouring for inspection of formwork and reinforcing steel. Modifications or additions required by the Engineer shall be rapidly executed.

.3 Contractor is sole responsible for any modifications or additions not performed after Engineer’s instructions.

.4 Clean all transportation and mixing equipment of all hardened concrete before starting pouring concrete.

.5 Remove all foreign materials from formwork.

.6 Dry formwork from any water before pouring.

.7 Fill all draining pipes with mortar when concrete as begun to hardened. No concrete shall be poured directly in water.

### 3.3 Handling

.1 Move concrete swiftly in formwork so to prevent segregation. No concrete that has partially hardened or been contaminated by foreign materials shall be used in the works. No retempered concrete shall be used. Concrete placing shall be carried out in only one handling, keeping the pouring horizontal and plastic until the end of the pour.

.2 Concrete shall be placed in a continuous operation until a panel or section is completed. The pour shall be carried out

as fast as possible to ensure a adequate bond between each layer of concrete. The concrete shall be compacted continuously to bring air bubbles on top.

.3 Take the necessary measures to keep formwork in good conditions under concrete pressure.

.4 It is forbidden to place concrete in formwork in a way that segregation occurs between coarse aggregate and the cement.

.5 Separators and supports shall not be removed before concrete gets to their level.

.6 Use appropriate openings in formwork of thin walls or other sections in order to facilitate placing of concrete and prevent segregation.

3.4 Concrete placement

.1 All concrete shall be compacted with vibrators approved by the Engineer. At least 3 vibrators shall be used for a concrete pouring rate lower than 10 cubic metres per hour.

.2 An additional vibrator shall be supplied for each additional 5 cubic metres per hour. Minimum vibrator frequency shall be 7,000 RPM and the action radius be at least 180 mm.

.3 No excessive vibration shall be done and formwork vibrators are forbidden.

3.5 Continuous pour

.1 Pour concrete in a continuous operation to avoid placing new concrete on hardened concrete resulting in poor joints.

3.6 Concrete joints

.1 Before pouring new concrete on hardened concrete the surface shall be roughened and cleaned of any free concrete or aggregates. Water thoroughly.

.2 Clean and water the entire surface and cover with cement grout prior to concrete placing.

3.7 Curing

.1 Concrete temperature shall be maintained over 10$^{o}$ C in cold weather and the surface kept moist for the next seven (7) days.

.2 Submit to the Engineer's approval the protection to be taken by the Contractor to protect concrete against low temperature in accordance with the ACI 306.

.3 Concrete surfaces shall be protected against lost of humidity

in keeping the surfaces continuously wet and covered from sun rays during seven (7) days.

.4 Protection to start while pouring.

.5 Use wet tarpaulin approved by the Engineer.

3.8 Loading and damages

.1 Do not add loads on new concrete elements before or after formwork removal if concrete has not sufficiently hardened.

3.9 Field testing

.1 Field testing will be done by the testing laboratory in accordance with specifications C-31, C-39, and C-78 of CSA A23.2.

.2 The testing laboratory shall have free access to field works and for choosing samples, while supplying the required concrete and protecting the samples against any loss or damage.

.3 Three (3) cylinders sampling will generally be carried out per day for pours not exceeding 100 cubic metres and three (3) additional cylinders for each 75 additional cubic metres.

.4 The Engineer or his representative can stop work if concrete execution fails to meet specifications described herein.

3.10 Failure to meet specifications

.1 To meet specifications, the mean of five (5) consecutive compression strength tests shall reach the specified strength and no test shall be less than 80% of the specified strength.

.2 In the case of non-conformity, the analysis-related costs required by the engineer and the laboratory shall be paid for by the contractor, even if the structural analysis show that the concrete can be accepted.

3.11 Inserts

.1 Set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated on structural or civil drawings must be approved by Engineer.

.2 Do not take away or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of all modifications from Engineer before placing concrete.

.3 Check locations and sizes of sleeves and openings shown on

structural drawings with electrical drawings.

.4 Place embedded elements as described in detailed design drawings in accordance with specifications of the non destructive test sampling methods.

3.12 Defective Concrete

.1 After formwork removal, concrete is inspected by the Engineer. Correctives measures will be issued by the Engineer if necessary.

.2 Remove all defective concrete and repair as specified by the Engineer.

.3 No concrete repair shall be made prior to the Engineer's inspection and repair approval.

3.13 Field Quality Control

.1 Contractor shall make sure that all related items embedded in concrete are installed.

.2 Inspection and concrete testing will be carried out by the testing laboratory designated by the Owner (and paid by Owner).

.3 Submit samples of fine and coarse aggregates as well as the proportioning formula to the testing laboratory in accordance with CAN3-A23.2.

.4 Testing laboratory shall take an additional testing cylinder when concrete is poured under low temperatures. Make sure that the cylinder in cured under the same conditions as for the concrete under quality control.

.5 Non-destructive concrete testing shall be in accordance with CAN3-A23.2.

.6 Concrete testing : All concrete testing is carried out by the laboratory. Contractor shall supply necessary concrete for testing.

.7 Protection : Use all necessary means to protect cast in place concrete, before, during and after pouring. In case of damage or dent caused to poured concrete, take immediate action to repair works at the Engineer's satisfaction and this at no extra costs to Owner.

.8 Inspection or testing by Owner, Laboratory do not replace Contractor quality control actions nor relieve him from his contractual responsibility.

3.14 Approval of the structure

.1 The completed concrete works that meet all requirements of these specifications shall be accepted unconditionally. The completed concrete works that have not met one or many requirements but, however, have been repaired to the engineer's satisfaction shall also be accepted unconditionally. The completed concrete works that have not met one or many requirements of these specifications and, furthermore, cannot be brought to the full acceptance with regards to the specifications will either be approved or rejected.

.2 Concrete that is hidden from view is not necessarily rejected due to superficial defects.

.3 The resistance of the structure in place is considered to be potentially deficient if it does not fully satisfy the requirements that control the structure's resistance, including but not necessarily limited by the following conditions :

.1 Compression resistance weaker than required.

.2 Size, quantity, quality, positioning or arrangement of the reinforcing steel not conforming with the 03 20 00 section of these specifications.

.3 Concrete that doesn't meet the requirements with regards to dimensioning or positioning, resulting in lower than targeted resistance.

.4 Curing of the concrete not conforming to the specifications.

.5 Inadequate concrete protection against temperature fluctuations during initial curing phase.

.6 Mechanical failures, fire during construction, and premature removal of formwork that can result in a deficient resistance.

.7 Low-quality labour susceptible of causing a deficient resistance.

- END OF SECTION -

## PART 1 - GENERAL

**1.1 Scope of Work**

.1 The work in this section includes the supply of all equipment, material, labour and transport necessary for the complete execution of excavation and backfilling work including:

.1 Excavation for foundations and exterior work.

.2 Backfilling of foundations and exterior work.

.3 Compaction of backfilling materials.

.4 Frost protection.

.5 Temporary drainage of the excavations.

.6 All associated works specified elsewhere in plans and specifications.

**1.2 Soil condition**

.1 The information included in the documents are given as general indications only and the Contractor shall execute all investigations that he considers necessary in order to fully assess all existing conditions.

**1.3 Related Works**

.1 Concrete formwork and falsework section 03 10 00

.2 Cast-in-place concrete section 03 30 00

**1.4 Regulations**

.1 All the work must be done in accordance with NBC, CSA and safety Code for construction work.
Complete while complying with the rules and norms of the “Code du travail”, of the National Building Code, of the C.S.A, and of the “Code de Sécurité pour les travaux de construction”, from the “Bureau de normalisation du Québec et du Ministère du développement durable de l’eau et des parcs“ (MDDEP) and the municipal bylaws applicable by the city of Sainte-Anne-des-Plaines and of the borough in question.

**1.5 Definitions**

.1 Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1.0 $m^3$.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials

and partially cemented materials which can be ripped and excavated with heavy construction equipment.

.3 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

1.6 Work Layout

.1 Supply a competent person to establish the reference and work lines. Follow carefully the construction procedure and take all necessary precautions.

1.7 Protection of Features

.1 Existing buried utilities and structures:

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

.2 Prior to commencing any excavation work, notify Owner or Authorities, determine location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.

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

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated. Obtain direction of Engineer before moving or otherwise disturbing utilities or structures.

.5 Advise Engineer prior to re-route existing lines in area of excavation. Costs for such work will be paid by Owner.

.2 Existing buildings and surface features:

.1 Conduct, with Engineer, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by works.

.2 Protect existing buildings and surface features which may be affected or damaged by works and repair damage resulting from works.

.3 Protect the bottom of the excavated trench against any softening; if this happens, remove all of the softened soil and replace with a compacted crushed gravel backfill.

.4 Take any precautions necessary (which must be approved) in order to eliminate the produced dust.

.3 Protection against frost :

.1 The contractor must suitably protect, at his own cost, the materials and all works against frost. The engineer can require from the contractor, without any additional cost, any measure necessary such as heating of the materials, temporary shelters, tarpaulins, etc. It is never permitted to perform works on a frozen soil.

1.8 Quality Control

.1 Two weeks before starting the work, Contractor should advise the Engineer on its source of materials and permit him to have access for sampling.

.2 The testing company appointed by the Owner should have easy access to verify the works executed by the Contractor. Contractor should furnish whatever material is necessary for analysis.

1.9 Borehole Tests

.1 The borehole test results included in the appendix are provided for general information only.

.2 It is the contractor's responsibility to appropriately evaluate all the conditions with regards to the required excavations, in order to meet the security norms and requirements of the corresponding plans and specifications.

## PART 2 - PRODUCTS

### 2.1 Materials

.1 Type 1 backfill (20-0) : Clean crushed gravel, hard, resistant and free of shale, clay and any friable materials, organic or deleterious; during the tests done according to the ASTM C136 norm, the particle size must remain within the following ranges :

| ASTM sieve size | % passing |
|---|---|
| 31,5 mm | 100 |
| 20 mm | 90 - 100 |
| 14 mm | 68 - 93 |
| 5 mm | 35 - 60 |
| 1.25 mm | 19 - 38 |
| 0.315 mm | 9 - 17 |
| 0.080 mm | 2 – 7 |

.2 Type 2 backfill (Class A sand) : Clean sand, hard, resistant and free of shale, clay and any friable materials, organic or deleterious; during the tests done according to the ASTM C136 norm, the particle size must remain within the following ranges :

| ASTM sieve size | % passing |
|---|---|
| 80 mm | 100 |
| 5 mm | 50 - 100 |
| 0.315 mm | max. 50 |
| 0.160 mm | max. 10 |
| 0.080 mm | max. 5 |

.3 Type 4 backfill (Class B) : Materials chosen amongst the excavation materiels or elsewhere, approved by the engineer for the proposed use, non-frozen and exempt or rocks larger than 75mm in diameter, with no slag, ash, or sod waste.

.4 Conserve the reusable excavation materials for backfilling on site of trenches only. Transport waste outside of the property limits, any surplus excavation material or material that is not reusable.

.5 Excess material shall be disposed in a location that conforms with the law on the Quality of the Environment, to the laws on solid waste and on hazardous waste of Québec. The contractor shall provide the Owner with written proof that the materials were disposed of in an appropriate location.

## PART 3 - EXECUTION

### 3.1 Site Preparation

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

.2 Remove from the site all existing foundations interfering with new construction including walls, slabs and unutilised footings.

.3 Remove top soil from the specified site for excavation and stockpile it up according to the engineer instructions in order to use it back once the backfilling is completed.

.4 At the end of the job, evacuate any unused topsoil outside the property limits.

.5 Carefully cut pavements and sidewalks along the specified boundaries of excavations so that surfaces break neat and squarely.

### 3.2 Storage

.1 Put aside the backfilling materials at areas stipulated by the Engineer. Stockpile granular material in order to prevent segregation.

.2 Protect the backfilling material against contamination.

### 3.3 Shoring, bracing and and underpinning

.1 Prevent excavations to collapse or run; provide and drive all the steel or wood piling and other necessary support for the protection of the existing works.

.2 Respect maximum slopes of 1 in 1 for excavations. The Contractor has to, at all time, take in account the nature of the soil and excavate according the requirements of the CSST.

.3 The Contractor is the sole responsible for damages that may occur because of the absence or weakness of pilings, girts, steel pilings, etc and for all damages to people or property that is caused by an incorrect execution, poor maintenance or removal of those.

.4 Once the constructions completed:

.1 Remove the shoring and bracing works;

.2 Remove surplus material out of the site.

### 3.4 Dewatering

.1 Keep excavations free of water while work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

.4 Engineer must approved the details of the proposed methods for the drainage of the excavation.

.5 Provide pumps and drains, build embankments and use all other means necessary to divert and remove water from the excavations and other parts of the works. Where necessary evacuate surface and underground water from whatever source. Keep dry the excavations and other sectors of the works until all works are completed and backfilling has been done.

.6 Rapidly remove all water, mud and debris which could penetrate or accumulate in the works executed under this contract.

.7 All costs of works for this section must be included in the lump sum price submitted.

3.5 Excavation

.1 Execute the excavation works according to the layout, levels and dimensions indicated on the drawings.

.2 Common excavations include removal of pavements, natural earths and existing backfills, foundation walls, all other artificial works, rock blocks, boulders of less than 1.0 cubic metre. No supplementary remuneration will be accorded to the contractor for excavation of quicksands, hardpan or any other kind of material.

.3 Excavation of earth, frozen earth and rock shall be carried out by hand on each side of existing buried utilities, on a width of 1 metre and, under to the level of structure base to install. No additional remuneration will be accorded for these works when shown on drawings even if the location is approximate.

.4 Do not disturb 45°load transfer cones under the footings.

.5 Transport any unclean or surplus fill outside of the job site. Contaminated materials must be disposed of in a location authorized by the M.D.D.E.P.

.6 Avoid to block the waters through-flow. Before draining any underground waters in the storm sewer during the excavation, the Contractor shall execute all necessary analysis before doing so. If analysis confirm the waters are

not acceptable, the Contractor shall threat them before draining them.

.7 Bottom of excavations to be undisturbed soil, level, free from loose, soft or organic matters.

.8 Unless it is authorized by the Engineer, it is forbidden to dig more than 30 m of trenches in advance. At the end of a work day, no trench shall be left opened.

.9 When the excavation have reached the required depths, advise the owner's soil Laboratory. The Laboratory must provide the Engineer with a compliance report with standards for the bottom of the excavations. Generally, digging embankment must be maintained at a distance of less than 300 mm from the foundations.

.10 Whenever digging was executed too deep, fill the unauthorized excavations below:

.1 Pour 20 MPa concrete over the bearing surfaces of footings.

.2 Elsewhere, backfill with 20-0 crushed stone and compact it to a minimum of 95% of the modified maximum dry mass volumetric ratio.

.11 Complete the excavation manually, harden the jambs and remove all non attached material and waste. When the ground excavation materials have been remodelled, compact the excavation to a volume ratio at least equal to the one of the non remodelled ground. Clean all cracks in rock and fill them with concrete mortar or with grout, and this to the satisfaction of the Engineer.

3.6 Unstable under-foundations

.1 When the materials forming the base of the excavations brought at levels indicated on the drawings are found to be to weak or for any other reasons are inadequate to support the structure, excavate to a lower level and build special foundations as ordered by the Engineer. In this event, the Contractor must wait for a specific order from the Engineer.

.2 When the Engineer concludes that the weak or inadequate materials are in this condition because of the inadequacy of the Contractor to correctly protect and adequately drain the working site or are due to any other negligence by the Contractor, the Contractor shall, at his own expense, excavate deeper and fill the excavation in a satisfactory manor up to the required level, even if he has to utilize concrete or use any other ways to support the structure

adequately.

.3 However, if the Engineer comes to the conclusion that the weak or improper conditions of the ground are due to unpredictable factors, the special works to be executed by the Contractor according to instructions, will be paid to him after an agreement is reached with the Owner.

3.7 Unauthorized Excavation

.1 If unauthorized excavation has been made beyond the lines and level indicated, Contractor shall at its own cost backfill excavated area with approved material to the Engineer's satisfaction.

3.8 Backfilling

.1 Do not proceed with backfilling operations until Engineer has inspected and approved installations.

.2 Before backfilling, clean the site of all improper material. Remove waste out of the limits of the property.

.3 Backfill all excavations executed to remove improper materials with suitable materials and compact those to the same density as surrounding soils.

.4 Remove all weak or elastic material over the entire surface that cannot be compacted properly by the conventional processes.

.5 Areas to be backfilled, to be free from debris, snow, ice, water or frozen grounds.

3.9 Compaction

.1 Compact backfills in the following manner:

.1 Place granular backfills in horizontal layers distributed uniformly over the area. The thickness of each layer must not exceed 300 mm.

.2 Sprinkle surfaces with clean water until optimum humidity has been obtained.

.2 Densification:

.1 Before densifying, each layer must be as uniform as possible.

.2 Once uniform humidity has been obtain, densify each layer until the prescribed volume has been reached before placing the next layer. Every backfilling type must have independent compaction.

.3 All backfilling works must be done with the supervision of the inspection Laboratory, otherwise all claims could be ignore. The contractor will be responsible of any resulting delay of the turnover.

3.10 Frost Protection

.1 When backfilling is being done in freezing temperatures, defrost and heat material before placing and densifying it. Protect surfaces from frost until backfilling is completed.

3.11 Restoration

.1 Upon completion of works, remove surplus materials and debris, trim slopes, and correct defects noted by Engineer.

.2 Clean-up and restore to the original state, disturbed areas to the Engineer's satisfaction.

- END OF SECTION -