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Montréal  
Québec  
H5A 1L6

**SOLICITATION AMENDMENT  
MODIFICATION DE L'INVITATION**

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

**Comments - Commentaires**

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Travaux publics et Services gouvernementaux Canada  
Place Bonaventure, portail Sud-Oue  
800, rue de La Gauchetière Ouest  
7e étage, suite 7300  
Montréal  
Québec  
H5A 1L6

<b>Title - Sujet</b> Rénovation Aéroport de Kuujjuaq	
<b>Solicitation No. - N° de l'invitation</b> EF997-182807/A	<b>Amendment No. - N° modif.</b> 001
<b>Client Reference No. - N° de référence du client</b> R.079464.001	<b>Date</b> 2018-07-03
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$MTC-360-14916	
<b>File No. - N° de dossier</b> MTC-7-40370 (360)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2018-07-17</b>	<b>Time Zone</b> Fuseau horaire Heure Avancée de l'Est HAE
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Abidar, Samia	<b>Buyer Id - Id de l'acheteur</b> mtc360
<b>Telephone No. - N° de téléphone</b> (514) 212-4965 ( )	<b>FAX No. - N° de FAX</b> (514) 496-3822
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b>	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

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<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

## **INVITATION TO TENDER**

### **Renovation of the multi-purpose building at Kuujjuaq airport Kuujjuaq Airport**

#### **Modification 1:**

Please find enclosed herewith the above mentioned addendum which forms part of the tender documents.  
Closing date has been postponed until July 17, 2018 at 2:00pm Eastern Daylight Time.

**All other terms, clauses and conditions remain unchanged.**

Consortium Avataa/Stavibel

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**Public Works and Canada Government Services**

**Kuujuaq Airport**

**Development of the multi-purpose building site**

**Technical Specifications**

**Project N° R.079464.001**

**ADDENDUM N° 1**

This addendum is an integral part of the plans and specifications and must be accepted as part of the contractual tender documents.

Please note the following changes:

## **ARCHITECTURE**

### **PLANS**

- 1.1 Drawing Q121Q612A021 – Demolition – Ground floor plan**
  - 1.1.a Plan 1: Cancel note 9 indicated for the door on axis 1 and replace with the following note:  
“Door and frame to demolish”
- 1.2 Drawing Q121Q612A025 – Construction – Roof plan**
  - 1.2.a Add metallic gutter above the four (4) pedestrian entrance.
- 1.3 Drawing Q121Q612A042 – Construction – Envelope details**
  - 1.3.a Detail 4 – Add the following note:  
2’’x6’’@12’’c/c parapet-Filled with insulation
- 1.4 Drawing Q121Q612A044 – Construction – Envelope details**
  - 1.4.a Detail 5 – Insert the flashing on head in the insulated panel.
  - 1.4.b Detail 6 – Membrane indicated on wood moulding, behind the flashing is self-adhesive membrane. Add a membrane behind the wood molding.
- 1.5 Drawing Q121Q612A050 « Mezzanine – Storage » is added in present addendum.**

### **SPECIFICATIONS**

- 2.1 Section 08 80 50 - Glazing**
  - 2.2.a Article 2.01.2 – Insulated glazing, double glazed is indicated (VD) and is referenced on doors schedule.
- 2.2 Section 08 71 01 – Doors schedule and hardware**
  - 2.3.a For existing garage door, add in remarks to provide 4h of maintenance per door.
  - 2.3.b The glazing of the doors, double glazed, described to the section 08 80 50 is indicated (VD) to the doors schedule
  - 2.3c The numbering in the table of contents is corrected.

## **MECHANICAL**

### **PLANS**

#### **3.1 Drawings Q121Q612M021 and Q121Q612M022**

Modifications to the shutter of supply and evacuation of ventilation of the building. See attached sketch.

#### **3.2 Drawing Q121Q612M017**

The dimension of proposed chimneys of heating system CC1 and CC2 is 150 mmø.

### **SPECIFICATIONS**

#### **4.1 Section 23 05 00 - Article 1.1 – General – Adding the article 4.**

4. All work must comply with the Canadian Environmental Protection Act (CEPA), as well as CSA-B139 and CSA-B140.

#### **4.2 Section 23 05 00 – Adding the article 1.1.5 – Standards and References**

##### **1.1.5 STANDARDS AND REFENCES**

1. Code national du bâtiment 2015.
2. Code national de prévention des incendies 2015.
3. Code national de plomberie 2015.
4. Code canadien de l'électricité – CSAC22-1-2015.
5. Code canadien du travail – Partie II.
6. Code modèle national de l'énergie pour les bâtiments.

#### **4.3 Section 23 05 01 – Article 1.28 – Special conditions, adding the article 3.**

- .3 The Contractor must make all arrangements for fuel oil recovery and disposal in accordance with environmental requirements.

## STRUCTURE

### PLANS

#### 5.1 Addition of plan **Q121Q612S004** including:

A key identifying the pictograms, symbols and hatching appearing in the plans.  
Addition of general notes to understand the references, codes and standards related to the project.

#### 5.2 In reference to plan Q121Q612S007: Indication of tensile forces in the bracings.

### SPECIFICATIONS

#### 6.1 **General**

The use of terms like Owners, Engineers and Professionals is replaced by Departmental Representative, respectively.  
In the REFERENCES section of each of the specifications, the reference year is designated.  
In the RELATED SECTIONS section, all sections cited in the text have been added.  
All references to terms of payment have been removed.

#### 6.2 **Section 03 10 00** - Article 1.6.2 is added. A re-shoring plan must be produced and sealed by an Engineer.

#### 6.3 **Section 05 12 23** - Article 2.1.6 - ACNOR is replaced by CSA at the reference of the standard.

#### 6.4 **Section 05 12 23** - Article 3.3.2 - Article canceled.

#### 6.5 **Section 31 23 33.01** - Article 1.4.1- The contractor is not required to visit the work site.

#### 6.6 **Section 31 23 33.01** – Article 1.5.1 - The FO 16-4 borehole lug is included at the specifications.

#### 6.7 The following sections has been replaced in this addenda.

##### **Division 03 Concrete**

03 10 00	Concrete forming and accessories
03 20 00	Concrete reinforcing
03 30 00	Cast-in-place concrete

##### **Division 05 Metal**

05 12 23	Structural steel for buildings
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##### **Division 31 Earthwork**

31 09 16.28	Pile tests
31 23 33.01	Excavating trenching and backfilling
31 62 16.19	Unfilled tubular steel piles
31 63 19	Bored and stocketed piles

## **ELECTRICAL**

### **PLANS**

**7.1 Plan Q121Q612E007 revision 1 is entirely reissued in revision 2. See all changes surrounded by a bubble.**

The AIMLITE brand rechargeable battery must be 350W to ensure lighting for 2 hours.  
The minimum positioning device for the new air damper is supplied by the ventilation contractor.

**7.2 Plan Q121Q612E008 revision 1 is entirely reissued in revision 2. See all changes surrounded by a bubble.**

Several notes have been modified/added.  
Notes and information are to the one-line diagram. For example, provide new wiring between the COMPRESS switch and the COMP1 compressor.  
The “BU” panel has been modified.  
The fire alarm panel must have sufficient batteries to maintain optimal function for 2 hours.  
Install 2 relays to cut off ventilation and a module to supervise the generator in the fire alarm panel.  
Some details have been added on the outdoor lighting control diagram.

**7.3 Plan Q121Q612E011 revision 1 is entirely reissued in revision 2. See all changes surrounded by a bubble.**

The term FIRE PUMP has been removed because there is no sprinkler system. It is an OVERPRESSURE FIRE PUMP. This pump and the WATER PUMP have been located on the plan.  
The location of the COMP1 compressor has been added. Plan to remove the compressor wiring and power to the COMPRESS switch.  
The WATER PUMP should be moved to the ground floor, so plan to extend the wiring.

**7.4 Plan Q121Q612E013 revision 1 is entirely reissued in revision 2. See all changes surrounded by a bubble.**

The WATER PUMP is now in room 103.  
The new COMP1 compressor has been added to the mezzanine. Provide new wiring between the COMPRESS switch and the COMP1 compressor.

**7.5 Plan Q121Q612E014 revision 1 is entirely reissued in revision 2. See all changes surrounded by a bubble.**

The circuits shown on the outdoor lighting have been removed because all the lighting is powered from the outdoor lighting control (OLC).  
Certain room numbers on the garage 300 side have been changed.  
The connection of the safety lighting and the fire alarm panel has changed.  
Garage 100 has its own battery #1 connected to the same circuit as the “normal” lighting.  
A battery has been added in garage 200 (battery #2) and is connected to the same circuit as the “normal” lighting.

Garage 300 has its own battery #3 connected to the same circuit as the “normal” lighting.  
Two double beacons have been added to the mezzanine of garage 300.

### **SPECIFICATIONS**

**8.1 Specifications, section 26 05 01, articles 2.5.1.1.6 and 2.5.1.1.7 are changed as follows:**

- .5 Cable (2 # 18 twisted/shielded) for all addressable detection, surveillance, command and control networks. In the conduits, provide one (1) **green #14 cable for grounding** all detection, surveillance, control and command boxes and devices.
- .6 Cables (2 # 16) for all signalling networks. In the conduit, provide one (1) **#14 green cable for grounding** all signalling boxes and devices.

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Gilles Marcotte, Eng.  
Infrastructure

**1 GENERAL****1.01 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
  - .1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
  - .2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
  - .3 ANSI/BHMA A156.3-2001, Exit Devices.
  - .4 ANSI/BHMA A156.4-2000, Door Controls - Closers.
  - .5 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
  - .6 ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
  - .7 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
  - .8 ANSI/BHMA A156.18-2006, Materials and Finishes.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
  - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

**1.02 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Hardware List:
  - .1 Submit contract hardware list.
  - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions.

**1.03 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

**1.04 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Extra Stock Materials:
  - .1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Tools:
    - .1 Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.

**1.05 QUALITY ASSURANCE**

- .1 Regulatory Requirements:
  - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**1.06 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect door hardware from nicks, scratches, and blemishes.
  - .3 Protect prefinished surfaces with wrapping or strippable coating.
  - .4 Replace defective or damaged materials with new.

**2 PRODUCTS****2.01 HARDWARE ITEMS**

- .1 Use one manufacturer's products only for similar items.

**.02 DOOR HARDWARE**

- .1 Locks and latches:
  - .1 Interconnected locks and latches: to ANSI/BHMA A156.12, series 5000 interconnected lock, grade 1, designed for function as stated in Hardware Schedule.
  - .2 Roses: round.
  - .3 Normal strikes: box type, lip projection not beyond jamb.
  - .4 Cylinders: key into keying system.
  - .5 Lever
  - .6 Finished to 626.
- .2 Butts and hinges:
  - .1 Butts and hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.
- .3 Exit devices: to ANSI/BHMA A156.3, function 08, grade 2, modern design, finished to 626.
- .4 Door Closers and Accessories:
  - .1 Door controls (closers): to ANSI/BHMA A156.4, designated by letter C and numeral identifiers listed in Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1, finished to 626.
  - .2 Door controls - overhead holders: to ANSI/BHMA A156.8, designated by letter C and

- 
- numeral identifiers listed in Hardware Schedule.
  - .3 Closer/holder release devices: to ANSI/BHMA A156.15, designated by letter C and numeral identifiers listed in hardware schedule.
  - .4 Door co-ordinator: surface for pairs of doors with overlapping astragal.
  - .5 Auxiliary locks and associated products: to ANSI/BHMA A156.5, class 2, function EO141, finished to 626..
  - .6 Architectural door trim: to ANSI/BHMA A156.6, finished to 626.
    - .1 Door protection plates: kick plate, 1.27 mm thick stainless steel, height 200 mm x door width.
  - .7 Flush bolt, to ANSI/BHMA A156.16, LO4351, finished to 626
  - .8 Auxiliary hardware: to ANSI/BHMA A156.16, finished to 626.
    - .1 Door stop, wall mounted
    - .2 Door stop, floor mounted.
  - .9 Thresholds: 125 mm wide x full width of door opening, extruded aluminum, serrated surface, with thermal break of rigid PVC.
  - .10 Weatherstripping:
    - .1 Head and jamb seal:
      - .1 Extruded aluminum frame and solid closed cell neoprene, clear anodized finish.
      - .2 Adhesive backed neoprene material.
    - .2 Door bottom seal:
      - .1 Extruded aluminum frame and closed cell neoprene sweep, clear anodized finish.

### **2.03 FASTENINGS**

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.
- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with material through which they pass.

### **2.05 KEYING**

- .1 Supply keys in 5 for every lock in this Contract.
- .2 Supply 3 master keys for each master key or grand master key group.
- .3 Stamp keying code numbers on keys and cylinders.

**3 EXECUTION****3.01 INSTALLATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .6 Use only manufacturer's supplied fasteners.
  - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

**3.02 ADJUSTING**

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

**3.03 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
  - .3 Remove protective material from hardware items where present.
  - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.04 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by door hardware installation.

**3.05 SCHEDULE**

- .1 **Groupe 01**
  - .1 Three (3) hinges A5111, BI, 114 mm x 101 mm, 630.
  - .2 One (1) exit device 630.
  - .3 One (1) door closer C02021
  - .4 One (1) weather stripping kit
  - .5 One (1) Threshold

- 
- .6 One (1) door stop (wall mounted)
  - .7 One (1) kick plate
  
  - .2 **Groupe 02**
    - .1 Three (3) hinges A5111, BI, 114 mm x 101 mm, 630.
    - .2 One (1) Interconnected lock, F81, 630
    - .3 One (1) door stop (wall mounted)
    - .4 Two (2) kick plate
  
  - .3 **Groupe 03**
    - .1 Six (6) charnières A5111, BI, 114 mm x 101 mm, 630.
    - .2 One (1) Interconnected lock, F86, 630
    - .3 Two (2) verrous encastrés
    - .4 Two (2) door stops (wall mounted)
    - .5 Four(4) kick plates

**END OF SECTION**

Projet **R079464001**

No. **87101**

## Doors and frames schedule, and hardware

### DOORS A

DOORS
AL: Aluminium B: Wood BCF: Wood ULC MS: Masonite finish AC: Steel ACF: Steel ULC ACI: Insulated steel V: Glass Ex.: Existing

HAND
G: Left hand D: Right hand GR: Reverse left hand DR: Reverse right hand G/D: Left hand / Right hand GR/DR: Reverse left hand / Reverse right hand B: Swing door C: Sliding door

WINDOWS
F: Fixed window F/O: Fixed/casement window O: Casement window
GLASS
U: Sealed glass V: Sealed glass + film

FRAMES
E: Maple finish B: Wood AC: Steel ACF: Steel ULC ACI: Insulated steel Ex.: Existing

SILL
AL: Aluminium M: Marble

GRILLE
C-F: ULC

GLASS
C: Clear glass VT: Tempered glass O: Round tempered glass AR: Reinforced glass VTS: Sealed tempered glass VB: Wired glass

XXX

Modifications



Architectes Guillemette Larue

13 juin 2018

Page 1 sur 2

Projet **R079464001**

No. **87101**

Étage **GROUND FLOOR**

**Tableau des portes, chambranles et quincaillerie**

No	De	À	Élev.	Mat	PORTES					CHAMBRANLES				OUV.		CLOISONS		REMARQUES	Rév.	
					Sens	L	H	Ép.	V.	S.	Grille	Élev.	Prof.	L	H	Mat	Quinc.			ULC
100.1	EXT	100																	Porte de garage existante Prévoir 4h entretien	
100.2	EXT	100	D1	ACI	DR	915	2134	45	VD	*							1		Cadre existant	
100.3	100	110	D2	AC	G	915	2134	45	VT	*	F2	915	2134	AC		2				
100.4	EXT	100	D1	ACI	DR	915	2134	45	VD	*						1			Cadre existant	
102.1	100	102	D2	AC	DR	915	2134	45	VT		F2	915	2134	AC		2				
102.2									VT		F3	967	2134	AC					Modification cadre existant	
103.1	100	103	D3	AC	DR	915	2134	45			F2	1300	2134	AC		3				
103.2	100	103	D3	AC	GR	385	2134	45			F2									
105	100	105	D2	AC	D	915	2134	45	VT		F2	915	2134	AC		2				
110.1	EXT	110	D1	ACI	GR	915	2134	45	VD	*	F1	915	2134	ACI		1				
200.1	EXT	200	D4			6205	4370												Porte de garage Contact de porte	
200.2	EXT	200	D4			6205	4370												Porte de garage Contact de porte	
200.3	EXT	200	D4			5955	4370												Porte de garage Contact de porte	
200.4	EXT	200	D4			5955	4370												Porte de garage Contact de porte	
300.1	EXT	300																	Porte de garage existante Prévoir 4h d'entretien	
300.2	EXT	300																	Porte de garage existante Prévoir 4h d'entretien	
300.3	EXT	300																	Porte de garage existante Prévoir 4h d'entretien	
300.4	EXT	300																	Porte de garage Prévoir 4h d'entretien	
300.5	EXT	300	D1	ACI	DR	915	2134	45	VT	*						1			Cadre existant	
300.6	EXT	300	D1	ACI	DR	915	2134	45	VT	*						1			Cadre existant	

**PART 1 GENERAL****1.1 DEFINITIONS**

- .1 No subject

**1.2 RELATED SECTIONS**

- .1 Section 03 20 00 – Concrete reinforcing
- .2 Section 03 30 00 – Cast-in-place concrete
- .3 Section 01 74 21 - Construction/demolition waste management and disposal
- .4 General requirements apply to the work described in this section

**1.3 REFERENCES**

This quotation refers to the latest edition and revision of codes and standards.

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1/A23.2 (2014), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1 (2014), Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121(2017), Douglas Fir Plywood.
  - .4 CAN/CSA-G164 (2018), Hot dip galvanizing of irregularly shaped articles
  - .5 CSA-G40.21 (2013), General requirements for rolled or welded structural quality steel
  - .6 CSA O151(2017), Canadian Softwood Plywood.
  - .7 CSA O153(2013), Poplar Plywood.
  - .8 CAN/CSA-O325.0 (2016), Construction Sheathing.
  - .9 CSA O437 (1993-R2011), Standards for OSB and Waferboard.
  - .10 CSA S269.1 (2016), Falsework for Construction Purposes.
  - .11 ASTM C109 (2016), Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
  - .12 Handbook SP 4 : «Formwork for Concrete», 4th edition, publish by the American Concrete Institute,
- .2 Underwriters' Laboratories of Canada (ULC)

- .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

#### **1.4 LINES AND LEVELS**

- .1 Place and secure on site all pin terminals required to erect formwork in strict compliance with the lines and levels shown on the plans.

The Contractor is solely responsible for the accuracy of these bench marks and must check them regularly and whenever the Representative of Ministry deems necessary.

- .2 Replace or immediately rectify any landmark terminal that has been removed or moved before the concrete work for which it is required have been completed and approved by the Representative of Ministry.

#### **1.5 SHORING OF FORMS**

- .1 Comply with each provision of Section VI of Safety Code for construction work, 2.1 S, r.6 published by Québec Official Publisher.

#### **1.6 SHOP DRAWINGS**

- .1 For surfaces that remain exposed, submit to Representative of Ministry for review the shop drawings of formwork. The orientation and size of plywood sheets, positions of form ties, sets of plates, and joints must be clearly indicated on the drawings. Exposed surfaces are shown on the architectural drawings and have the word 'exposed concrete'.

#### **1.7 OPENINGS AND SLEEVES**

- .1 Provide and implement formwork required to achieve all the openings shown on the structural drawings and other specialties including mechanical, electrical and architecture, including all sleeves. Coordinate number, diameter and position of each opening and each sleeve with the other disciplines.
- .2 Submit to Representative of Ministry for approval, shop drawings clearly indicating the size, location and, if applicable, the elevation of each of the breakthroughs and cavities that are required in the concrete frame for the passing or burial of electrical and mechanical equipment of the building.
- .3 All costs incurred to comply with the requirements of sub-section .2 above must be assumed by the Contractor.
- .4 The Contractor must not claim any extra in relation to openings shown on mechanical and electrical drawings but omitted on the structural drawings.

#### **1.8 ACCESSORIES REQUIREMENTS**

- .1 Provide and implement all specified accessories on plans, even though such equipment may not be described in this section.
- .2 The brand of each manufactured products described in this section must be approved by the Representative of Ministry. If the Representative of Ministry requests it, submit technical description and/or samples of the products as well as certified copies of test

results and tests conducted by independent laboratories, certifying the compliance of the products with the standard specifications governing its manufacture.

### **1.9 NON STRUCTURAL ELEMENTS**

- .1 In all cases where fixations are not mentioned on plans but are required in the concrete frame of the building to support vertically and/or laterally architectural elements, mechanical equipment parts, electrical or other, the structural design and calculations of these fasteners are entirely and exclusively the responsibility of the manufacturer who provides them, and does not commit in any way the Representative of Ministry responsibility of the Departmental Representative.
- .2 Fixations referred in sub-section .1 above include plates, angles and all other direct contact hardware parts with concrete of the framework, including rods, bolts, studs and various anchoring devices entirely or partially embedded in the concrete.
- .3 The Contractor must nevertheless submit to the Engineer for information two (2) copies of shop drawings clearly indicating the location of all required fasteners as well as the intensity and direction of the constraints that each fastener introduce into the concrete frame; These drawings must be beforehand "approved for construction" by an engineer active member of the Ordre des ingénieurs du Québec.

### **1.10 AUTHORIZATION OR APPROVAL OF REPRESENTATIVE OF MINISTRY**

- .1 When required in accordance with the requirements of this section, the permission or approval of the Representative of Ministry must not be regarded as having been obtained until it has been notified in writing or recorded in the minutes ratified by all persons attending meeting and where Representative of Ministry was also attending.

## **Part 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 For areas that remain exposed, use new or "new state" plywood, meaning that all corners and edges are intact and the surface should be smooth, with no unbounded surface lamellae.  
  
Smooth (meaning): at the time of stripping, plywood should not leave knot or wood fiber fingerprints in concrete.
- .2 Release oil: inert oil which does not stain the concrete and will not decrease the adhesion of coatings. Use vegetable oil that meets the requirements of laws and regulations relating to the environment. Submit specifications for consideration by the Representative of Ministry.
- .3 Form ties: use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .4 For exposed surfaces, form ties should not allow metal within 35 mm of the surface and leave a net hole made with a nylon cone or otherwise.
- .5 Shoring: telescopic cylinders steel.

**2.2 PRODUCTS ACCESSORIES**

- .1 Steel Embedded parts
  - .1 Steel embedded parts meet the requirements of CSA G40.21 standard, grade 300W.
  - .2 All embedded parts in concrete and exposed to outdoor conditions is hot dip galvanized in accordance with CAN / CSA-G164,
- .2 Precasted trim joints
  - .1 Foam-cell polyvinyl chloride boards (with sealed pores) not subject to extrusion, rigid nuance and a trademark approved by the Representative of Ministry.
- .3 Putty caulking joints
  - .1 Polyurethane based sealing mastic that meets the specifications of ONGC CAN2-19-GP-16M.
  - .2 The sealant used to seal joints in floors must be self-leveling.
- .4 Thermal Insulation
  - .1 For insulation boards shown in the drawings of concrete, extruded polystyrene and expanded meets the specifications of ONGC F41 GP 14a, type 4.
- .5 Grout (for base plates)
  - .1 Expansive cement grout that meets the requirements of ASTM C109, Class A. Use a pre-dosed product bag with a minimum strength of 30 MPa at the age of 7 days.

**Part 3 EXECUTION****3.1 ACCESSORIES**

- .1 Caulking joints
  - .1 Respect the dimensions given in the drawings and follow the manufacturer's recommendations.
- .2 Thermal Insulation
  - .1 Install boards so that they are not subsequently subject to be bent or to be perforated.
  - .2 Replace with no charge to the Ministry any board that, in the opinion of the Representative of Ministry, was damaged to the point that its insulating properties are reduced.
  - .3 Join panels without leaving any gap and seal the joints with plastic moisture resistant tape.
- .3 Waterproofing seals
  - .1 Even if there is no indication in the drawings, all vertical joints below ground level must be waterproofed with sealing blades.

- .2 Take care not to deform or damage the sealing strips by placing them in the forms; avoid moving the adjacent rebar and ensure that the forms do not move or fold during concreting.
- .3 Join sealing blades by hot welding, following the manufacturer's recommendations; each weld must be perfectly sealed. The abutment of the blades on the site is permitted only in the case of segments located in the extension of one another.
- .4 Embedded parts
  - .1 All embedded parts manufacturing work must be performed in accordance with the requirements of CAN3-S16.1
- .5 Adjustment of base plates for grouting (steel framing)
  - .1 Agree with the manufacturers of the superstructure of the dates on which the final adjustment of the base plates on columns and walls will be made.
  - .2 Measure out and implement the casting of grout according to manufacturer's directions. Ensure no vacuum is left on each plate.

### 3.2 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions correspond to drawings.
- .2 Erect formwork according to the tolerances specified in section 6 of CAN / CSA A23.1.
- .3 Minimize the number of joints in the formwork. No horizontal joint is allowed at a height of less than 3.2 meters above the floor in the forms of walls and columns, where the concrete must remain exposed.
- .4 Align the inner walls of forms sides joints and make them fully waterproof.
- .5 Bevel with triangular strips of 20 mm side edges of beams and columns, concrete must remain exposed unless otherwise indicated on the plans.
- .6 Secure to framework all components required for molding grooves, reinforcements, mortises, drips, etc. in strict accordance with the details shown in the drawings, including architectural drawings.
- .7 For areas marked on the structural or architectural drawings, where the concrete will remain apparent, position if required in the drawings, boards, sticks, etc., to obtain the specified texture.
- .8 Unless otherwise specified, form ties must be arranged in a regular module. Fill tie holes with gray plastic caps pale or dark gray depending on the appearance of the concrete, as approved by the Departmental Representative. The caps must be set back from the face of concrete.
- .9 After forms stripping, seal the bottom of holes using caulking approved by the Representative of Ministry. Exposed surface wood forms must be new or "new condition". Submit to Representative of Ministry for review the shop drawings formwork.

- .10 It must be prohibited, unless the Representative of Ministry have given permission, to mold into the forms openings that are not shown on the drawings referred in Article 1.9.

### **3.3 SHORING OF FORMS**

- .1 Adjust the height of each of the required shoring under the forms to compensate for subsidence that may occur during the installation of the concrete and adjust forms as prescribed in sub-section .2 below.
- .2 Determine the curvature required in the middle of the span of each element of the concrete floor of the building unless more specific indications are available on drawings.
- .1 Beams and slabs where the main reinforcement is unidirectional: 2 mm per net meter of length.
- .2 Slabs where the main reinforcement is bidirectional: 2 mm per meter along the diagonals joining the opposite edges of the quadrilateral formed by each panel.
- .3 In the case of beams or slabs that are cantilever, unless the Representative of Ministry specifies height, camber at the unsupported end of these elements must be 2 mm per net meter of length.
- .3 Make sure that items of formwork with imposed curvature will not be shallower in thicknesses or depths than those indicated on the plans.

### **3.4 CONSTRUCTION JOINTS**

- .1 Vertical elements laid in the forms to delimit construction joints in the concrete frame must be stiff, straight and perfectly straight; they must also be perforated so that the reinforcement that crosses them may be placed at the specified height and spacing according to the plans.
- .2 Set up the wood pieces to practice the key in the concrete.

### **3.5 ANCHOR BOLTS**

- .1 Position accurately and secure in the forms anchor bolts shown on the plans.
- .2 Use wooden template to position the anchors according to the elements to be anchored. Fix the anchors to the template with a nut and a washer above and below the template.
- .3 Coordinate delivery to the site of the anchor bolts with the supplier of those bolts.

### **3.6 ACCESSORY PARTS**

- .1 Place and secure in the forms in accordance with the details shown on the plans all accessory parts to be fully or partially embedded in the concrete.
- .2 Place and also secure in the forms other accessory part to be embedded in the concrete frame that is shown on architectural drawings, mechanical or electrical expressly approved in this regard by the Representative of Ministry.
- .3 Coordinate the delivery to site and the installation of accessory parts with suppliers of these parts.

- .4 It is prohibited to place in the forms accessory parts not stated on the plans or on the drawings referred to in Article .2 above, unless the Representative of Ministry has given his authorisation.

### 3.7 REMOVAL OF FORMWORK

- .1 Leave the formwork in place after placing concrete until the following periods have expired:
- .1 Footings: 24 hours;
  - .2 Walls, columns and beams sides: 3 days;
  - .3 Slab and beam soffits: 28 days, or 3 days if reshoring is made immediately (within 30 minutes or less) and remains in place until the end the aforementioned period of 28 days.
  - .4 The period of time specified above represent a number of cumulative hours, days or fractions of days, not necessarily consecutive, during which the ambient temperature is maintained to at least 10 ° C.
- .2 Notwithstanding the provisions of sub section .1 above, do not proceed to removal of formworks unless the Representative of Ministry is satisfied, with the measures taken to ensure concrete cure and protection against cold or heat and weather, and has given permission.
- .3 Representative of Ministry can however cancel the provisions of sub-section .1 above if non-destructive testing of the concrete in place in the forms indicates that the concrete has reached the following percentages of resistance to the specified compression:
- .1 Footings: 20%
  - .2 Walls: 40%
  - .3 Columns: 60%
  - .4 Beams and slabs: 80%
- .4 Non-destructive testing mentioned above must have a recognized value and be approved by the Representative of Ministry; it will determine beforehand where they are made. The costs of these tests must be assumed by the Contractor.
- .5 Even when it was authorized by the Representative of Ministry to proceed to removal of formwork and/or shore, the Contractor remains solely responsible for any damage to concrete framing members as a result of the premature execution of this work.

### 3.8 RESHORING

- .1 Submit to Representative of Ministry for approval a sketch indicating the number and the position of shoring to be held in place under framework of the floors after removal of formwork.
- .2 No charge in addition to their own weight must solicit the backbone of concrete elements when they are reshored immediately after removal of formwork.
- .3 The reshoring must be executed according to the requirements of Chapter 10 of Handbook SP 4 of the American Concrete Institute (see section 1.4).

**END OF SECTION**

**Part 1 GENERAL****1.1 DEFINITIONS**

- .1 No subject

**1.2 RELATED SECTIONS**

- .1 General requirements apply to the work described in this section
- .2 Section 01 74 21 - Construction/demolition waste management and disposal
- .3 Section 03 10 00 - Concrete forming and accessories
- .4 Section 03 30 00 – Cast-in-place concrete

**1.3 REFERENCES**

- .1 Reinforcing Steel Institute of Canada (RSIC), RSIC-2006, Reinforcing Steel, Manual of Standard Practice.
- .2 CSA A23.1-14 - A23.2-14 (2014)“Concrete materials and methods of concrete construction, test methods and standard practices for concrete”, article 6. Make the reinforcements and position them in the forms in accordance with the requirements of this Article unless they are modified or strengthened in this section.
- .3 CSA-A23.3-14 (2014)- Design of concrete structures, articles 7 to 12.
- .4 CAN/CSA G30.18 (2014), Carbon steel bars for concrete reinforcement
- .5 CSA G40.20/G40.21(2013), General requirements for rolled or welded structural quality steel
- .6 ASTM A497/A497M (1999), Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
- .7 ASTM A185/A185M (1979), Standard Specification for Welded Steel Wire Fabric For Concrete Reinforcement

**1.4 DOCUMENTS / SAMPLES SUBMITTALS**

- .1 Drawings of reinforcement must be applied according to the Manual of Standard Practice.
- .2 Submit shop drawings, which must show in particular , the location of the reinforcements, and specify or include the following:
  - .1 Rebar bending details.
  - .2 Rebar list.
  - .3 Number of rebar.

- .4 Drawings must show the dimensions, spacing, location of rebar and if necessary, mechanical connections. The rebar that are shown must be marked by an identification code to identify their location without the need to consult the structural drawings.
- .5 Drawings must also indicate the size, spacing, and placement of chairs, spacers and supports.
- .6 Lengths of encasement and lengths of overlap must comply with CSA A23.3.
- .3 Quality Control
  - .1 Report of the tests performed in the factory: provide the Representative of Ministry with a certified copy of the steel reinforcements test report made at the factory.

## **Part 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Reinforcing steel: billet steel, grade 400, deformed bars compliant with CSA-G30.18.
- .2 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
- .3 Cold-drawn annealed steel wire ties: compliant with ASTM A497/A497M.
- .4 Deformed steel wire for concrete reinforcement: compliant with ASTM A497/A497M.
- .5 Welded steel wire fabric: compliant with ASTM A185/A185M.
- .6 Chairs, bolsters, bar supports, spacers: compliant with CSA-A23.1/A23.2.
- .7 Mechanical splices: subject to approval of Quebec Ministry Representative.
- .8 Plain round bars: compliant with CSA-G40.20/G40.21.

### **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ANSI/ACI 315 and the handbook "Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada".
- .2 The Representative of Ministry must approve the locations of reinforcement splices other than those shown on placing drawings.
- .3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

## **Part 3 EXECUTION**

### **3.1 FABRICATION OF REINFORCEMENTS**

- .1 The manufacture of reinforcement should begin only when drawings and slips of these reinforcements have been reviewed by the Representative of Ministry.
- .2 Cut and bend the bars in strict conformity with the details shown on the reinforcement drawings reviewed by the Representative of Ministry. All bars should be bent cold.

- .3 No substitution of bars shown on the reinforcement drawings reviewed by the Representative of Ministry is permitted without the consent of the latter.
- .4 Ship armatures to the site in separate batches labeled so that they are easily identified on the order forms.
- .5 Take all precautions not to deform nor defile the reinforcements during transport, handling and storage on site.

**3.2 IMPLEMENTATION OF REINFORCEMENT**

- .1 If necessary before positioning them in the forms, straighten cold reinforcement and get rid of excess rust, scales, mud, oil and other soiling which reduces adhesion concrete.
- .2 Use an appropriate number of bar supports, with the height and rigidity required to allow covert everywhere that is consistent with thicknesses stipulated in Article 6 of CAN/CSA A23.1; in our case however bars 10-35 inclusive placed in slabs and walls not exposed to the weather or in contact with the ground, the thickness of the coating must be 25 mm. The distance between the bar supports must not exceed 1000 mm.
- .3 All rebar must be position sufficiently in advance to allow the Representative of Ministry to make full inspection before the start of each cast.

**3.3 REINFORCEMENT CONCRETE COVER**

- .1 Cover of reinforcements of structural elements must comply with CSA-A23.1 and CSA-S413, latest editions and respect the following table:

• Structural slab	Steel at top Stee at bottom	25 mm ± 10mm 25 mm ± 10mm
• Beam (stirrups)	Steel at bottom And on sides	30mm ± 10mm
• Foundation wall and interior wall	Typical In contact with ground	25mm ± 10mm 50mm ± 10mm
• Colomn cast-in-place (ties)	Typical In contact with ground	30mm ± 10mm 50mm ± 10mm
• Footing	In contact with ground Cast against ground (leaning against ground)	50mm ± 10mm 75mm ± 10mm
• Others	see CSA-A23.1 (latest edition)	

**3.4 TOLERANCE**

- .1 Tolerances allowed in the cutting of rebar are:
  - .1 10M and 15M bars and having a length less than 4 meters: + or 12 mm.
  - .2 10M and 15M and bars having a length greater than 4 meters: + or 25 mm.
  - .3 20M to 35M Bars: ± 25 mm.

- .4 45M and 55M bars:  $\pm 25$  mm.
- .2 Tolerances allowed in the shaping of bent rebar are the following
  - .1 Bars 10M to 35M:
    - .1 Overall length: 25 mm + or
    - .2 Overall height: 12 mm
    - .3 Hooks diameter: 12 mm or +
  - .2 Stirrups and ligatures:
    - .1 Width and overall height 12 mm or +
  - .3 45M Bars
    - .1 Width and overall height 65 mm or +
  - .4 55M Bars
    - .1 Width and overall height  $\pm 90$  mm.

### **3.5 WAITING REINFORCEMENTS**

- .1 It is prohibited to bend on-site reinforcement partially embedded in cured concrete unless the Representative of Ministry has granted permission.

### **3.6 WELDING OF REINFORCEMENTS**

- .1 Welding of reinforcements is allowed in specific cases where the Representative of Ministry granted permission.
- .2 Any welding work should be done by an enterprise accredited by the Canadian Welding Bureau and must be performed in accordance with the requirements of CSA Standard W186. Submit in advance to Representative of Ministry for approval all details of welds to be carried out. In this case, the reinforcing steel welding must comply with requirements of CAN/CSA G30.18 standard, 400W.
- .3 If the welded joints are required, they will be of type "CADWELD" or an approved equivalent. Those joints will be able to resist tensile load equivalent to 125% of the specified yield strength of the bars to be join unless otherwise specified in the drawings.
- .4 Subcontractor must verify the capacity of joints by destructive testing of joints made-in-place and selected by the Representative of Ministry. All costs of such tests and corrective measures are incidental expense assumed by Subcontractor with the exception of laboratory testing costs which are paid for by the Contractor.
- .5 Conformity verifications must have at least three (3) samples per used bar diameter and one sample per ten joints.

**END OF SECTION**

**Part 1 GENERAL****1.1 DEFINITION**

- .1 No subject

**1.2 RELATED SECTIONS**

- .1 Section 03 10 00 - Concrete forming and accessories
- .2 Section 03 20 00 - Concrete reinforcing
- .3 Section 01 74 21 - Construction-demolition waste management and disposal
- .4 General requirements apply to the work described in this section

**1.3 REFERENCES**

1. CSA A23.1 - A.23.2-14 (2014): "Concrete materials and methods of concrete construction, test methods and standard practices for concrete"; Comply with each requirement of this standard applicable to work to be performed, and changes or clarifications contained in this section. If there is contradiction between the two, this section shall prevail.
2. CAN/CSA-A3001 (2013), Cementitious Materials Compendium
3. CAN/CSA-G30.18.(2009), Carbon steel bars for concrete reinforcement
4. ASTM A185 (1979), Standard Specification for Welded Steel Wire Fabric For Concrete Reinforcement
5. ASTM D1751 (2013), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types
6. ASTM C309 03 (2011), Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
7. With reference to the above standards is an integral part of this section of the estimate, the Contractor must have a copy he keeps in his office the site.

**1.4 QUALITY ASSURANCE**

- .1 The Contractor is responsible for the quality control of the product and must provide his quality control program for examination by the Professional.
- .2 The Contractor must submit to the laboratory for examination and evaluation, the formulas proposed for the assay mixtures of each class of concrete, he must specify the type, brand and source of all additives used.

- .3 The Contractor must provide the laboratory, upon request, samples of aggregates that will be incorporated into concrete mixes and identify their sources.
- .4 Unless otherwise permitted in writing by the Professional, the laboratory must submit a test report performed by a laboratory recognized by him, certifying that the aggregates used in the manufacture of concrete are not likely to cause an expansion exceeding the values in table 1 of the standard method CAN / CSA-A23.2-27A.
- .5 The laboratory is authorized to issue memos about the quality and the implementation of concrete to which the contractor must comply. This does not relieve the responsibility of the contractor of its obligations to perform the work according to the plans and specifications; the quality of concrete is not a guarantee that concrete works were executed according to plans and specifications.
- .6 The Contractor must cooperate with the Laboratory's representative so that during each cast, he can closely monitor the implementation of concrete and collect samples required for control tests.
- .7 The Laboratory will measure slump and air content of the concrete each time it will take samples for resistance testing, and as often as necessary in regard to the nature of the work to build.
- .8 Professional reserves the right to inspect the work at the concrete factory of the Contractor at any time during opening hours. The Contractor must provide his cooperation during these visits.

### **1.5 CONCRETE SUPPLY**

- .1 All concrete must be supplied ready for use ("Ready-mix") by the same manufacturer. The concrete plant must hold a certificate issued by the "Bureau de normalisation du Québec" in accordance with NQ 2621-905 certification protocol.
- .2 The manufacturer of the concrete ready for use is responsible for dosing it and must at its own expense take all necessary steps to ensure the quality and consistency of its product.

### **1.6 AUTHORIZATION OR APPROVAL OF PROFESSIONAL**

- .1 In accordance with the requirements of this section, the permission or approval of the Professional must not be regarded as having been obtained until he has been notified in writing or recorded in the minutes ratified by all persons attending meeting and where Professional was also attending.

### **1.7 NON-COMPLIANCE OF CONCRETE**

- .1 Remove defective concrete, wet or containing debris and repair as directed by the Engineer. Fill honeycombs before applying the asphalt coating on concrete surfaces.

## **Part 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Portland Cement for general use, according to CAN/CSA A3001, Type GU-SF.
- .2 Water: according to CAN/CSA-A23.1/A23.2.

- .3 Rebar: shade 400, according to CAN/CSA-G30.18.
- .4 Steel mesh welded mesh : according to ASTM A185.
- .5 Precast joint
  - .1 fiber-bituminous board, according to ASTM D1751.

## 2.2 CONCRETE CONSTITUENTS

- .1 Conform to CAN/CSA-A23.1.
- .2 Mixing water: fresh, clear and clean.
- .3 Nominal size of coarse aggregate:
  - .1 14 mm in case of concrete slabs on metal deck;
  - .2 10 mm where there are high concentrations of armature;
  - .3 20 mm in all other cases.
- .4 The use of calcium chloride or adjuvant containing aggregate is prohibited.

## 2.3 MIXES FORMULAS

- .1 The sagging at the time and at point of discharge is minimum 75 mm and maximum 100 mm.
- .2 Provide documented proof that the selected dosage will produce a concrete with the prescribed quality and yield and resistance provided in accordance with CAN/CSA-A23.1. Approval of the concrete formula must be done in conformance to materials sampled on site. However, the Contractor remains responsible for the result.
- .3 Obtain approval of the laboratory before using chemical additives other than those specified in the mixing formula that was previously provided for verification.

## 2.4 MIXES

- .1 Produce and provide normal weight concrete as specified in the table below and in accordance with the requirements of this specification and drawings.

Structural element	Type of exposure	Resistance at 28 days (MPa)	Cement	Ratio W / L	Aggregates	air-entrained	Note
			Type				
Foundations, isolated footings	F2	30	GU	0.55	20	4% à 7%	--
Ground slab, interior	N	30	GU	0.55	20	4% à 7%	--
Foundation wall	F2	30	GU	0.55	20	4% à 7%	--
Columns/Pilasters, interior	N	30	GU	0.55	20	4% à 7%	--
Typical slabs and beams	N	30	GU	0.55	20 SIC	4% à 7%	--
Retaining wall, outside	F2	30	GU	0.55	20	4% à 7%	--
Sidewalks	C2	32	GU	0.45	20	5% à 8%	--

### Part 3 EXECUTION

#### 3.1 PREPARATION

- .1 Ensure that erection of the formwork is completed, that they are clean and free of ice, snow and water, and the reinforcements and extra parts have been placed in accordance with the prescriptions of sections 03 10 00 and 03 21 00.
- .2 If it is required to melt ice that adheres to reinforcement or to the inner walls of the formwork, use a steam jet or any other method approved by the Professional. The use of de-icing agents is never permitted.

#### 3.2 AUTHORIZATION TO CAST CONCRETE

- .1 Advise Professional at least 24 hours in advance whenever a concrete casting of any volume is planned.
- .2 No concrete cast should be undertaken without the authorization of the Professional.
- .3 The authorization will be granted only when the Professional has conducted his own inspection of forms and is satisfied in regard to the requirements of Article 3.1.
- .4 It is prohibited to cast concrete when raining or snowing, unless the Professional is satisfied with the arrangements made to protect the concrete during transport and casting, and has granted permission.
- .5 The authorization granted by the Professional to cast concrete when the outside temperature is below 5 ° C or above 25 ° C does not relieve the Contractor of any way of its responsibility with respect to the strength and durability of concrete which will be implemented.

**3.3 PRODUCTION AND TRANSPORT OF CONCRETE**

- .1 Ensure that the temperature of concrete delivered to the site is to the opposite of the outside temperature when it will be implemented, but is below the lower and upper limits specified in Tables 16 of CAN/CSA A23.1.
- .2 Plan the production of concrete and stagger deliveries to the site so that each casting can be carried out without interruption. Each batch of concrete must be fully discharged in the forms less than two (2) hours after the start of mixing.
- .3 It is prohibited to add water to the concrete during the journey from factory to building site. It is also prohibited to add water to the concrete before the casting of concrete trucks, unless the Professional gave permission; if so, the amount of water added will be recorded on the delivery and certified by the representative of the professional who will then sign the slip.

**3.4 IMPLEMENTATION OF CONCRETE**

- .1 Cast concrete without interruption or thick layers as each new layer will integrate with the underlying layers before the concrete thereof has hardened enough to cause cold joint.
- .2 If difficulties arise during its implementation, change the formula of concrete as directed by the Professional or the laboratory and use the adjuvant prescribed by the Professional or the laboratory; the Contractor will assume all costs.
- .3 Use appropriate vertical tubular conduit whenever the concrete must be deposited over a height of 1.5 meters or more.
- .4 The addition of the superplasticizing admixture to concrete before it is casted in the forms is required when concrete walls with height greater than 2 meters (including retaining walls), and also columns beams containing a high concentration of reinforcement.

**3.5 CONSOLIDATION OF CONCRETE**

- .1 Use internal mechanical vibrators and only entrust the handling to qualified operators. The diameter and the frequency of these vibrators are subject to approval by the Professional.

**3.6 CURE AND PROTECTION OF CONCRETE**

- .1 Except for the items mentioned in paragraph below, the use of curing compounds is permitted provided that these products meet the specifications of ASTM C309 03 and they detract from the adhesion or the establishment finishes.
- .2 In the case of floor tiles (or other items) exposed to the weather, sidewalks and curbs, the cure must be made in water by either of the methods described in section 21.1 .8 CAN/CSA A23.1 (water treatment).
- .3 Ensure that, for the duration of his treatment, the concrete will not be loaded with any overload and will be adequately protected against violent impacts, excessive vibrations, weather and other disruptions.
- .4 When the outside temperature is 27 C or more, comply with the requirements of CAN/CSA A23.1.

- .5 When the outside temperature is 5 ° C or less, or when it is possible that it drops to that level or lower in the 24 hours following the casting of concrete, comply with the requirements of CAN/CSA A23.1.
- .6 The supply, installation and maintenance of all temporary structures and devices required for curing and protection of concrete in hot weather or cold weather, as well as the power of these devices are part of the work contractors; bear all costs.

### **3.7 CONSTRUCTION JOINTS**

- .1 The location of construction joints defining each concrete casting must be approved by the Professional. If he thinks fit for reasons of structural continuity or appearance, the Professional may require that these joints get closer together or arranged differently.
- .2 No construction joints shown on the plans should not be cut or moved without the authorization of Professional.
- .3 Shape the vertical and horizontal construction joints in walls according to typical “groove and tongue” joint detailed on the plans. Also provide a longitudinal “groove and tongue” joint of a depth of 38 mm in any construction joint introduced into slabs having a thickness of 200 mm or more.
- .4 Subject for approval by the Professional, details of all the overlapping splices required in frames, that pass through construction joints not shown on the plans or drawings of reinforcement.
- .5 The execution of construction joints is part of the regular work of the Contractor and gives him no right to charge any supplement even when joints are added following the Professional guidelines.

### **3.8 RESUMING CONCRETE CASTING**

- .1 It is prohibited to undertake the concrete slabs and beams under two (2) hours after completing the walls and columns that support them, or while the concrete and the walls of these columns is still plastic.
- .2 Immediately before resuming casting of concrete against a construction joint or above it, scarify the surface of hardened concrete to detach milt and fragments that adhere to it and to partially expose the coarse aggregate; Then clean the surface thoroughly and moisten without saturating.
- .3 When the concrete is to be resumed over a horizontal construction joint introduced in a wall, a column or a beam of inverted T, pour a first layer of concrete having a thickness of 300 to 450 mm; use a mixture who collapse after adding a superplasticizing, is at least 150 mm and consolidate properly in place before resuming casting work.

### **3.9 SLAB ON GRADE**

- .1 Check that the embankments on which the concrete slabs will casted have been compacted and leveled to the satisfaction of the Departmental Representative and the laboratory, and they are clean and contain no traces of disturbed soil. If the work is performed in cold weather, make sure that these embankments are not frozen.

- .2 Moisten the embankments before placing concrete; in doing so, avoid causing the formation of puddles and muddy or soft areas.
- .3 It is prohibited to deposit directly on embankments welded wire mesh and other reinforcement required in slabs in preparation to raise and support the liquid concrete during its casting thereof.
- .4 Increase if necessary the thickness of the slab to allow an overlap of at least 40 mm of concrete above and below the electrical conduits.
- .5 In construction joints, 40 mm keys must be provided and coat the surface of the joint already in place with a curing agent to break the adhesion.
- .6 Alternatively, the Contractor can make control joints with a saw, respecting the requirements for construction joints.
- .7 In slabs, execute control joints in compliance with the following:
  - .1 Undertake this work 6 to 8 hours after casting, and complete within 18 hours after installation of the concrete.
  - .2 Use a chain saw equipped with a 5 mm thick blade and carve grooves with depth equivalent to a quarter (1/4) of the slab thickness.
  - .3 Immediately clean the grooves with a high pressure water jet to remove any milt accumulation.
  - .4 When concrete has completely dried, but not less than 21 days after its casting, dry clean each groove before closing them with self-leveling sealing mastic.

### **3.10 SLABS FINISHING SLABS AND HARDENER AND SEALER**

- .1 See architectural plans and structural and architectural specifications to determine the type of finish required for each slab of the building according to the requirements of sub-items .2 and .3 below.
- .2 Slabs that will be covered with hard coating or screed, clean tiles, outdoor platforms and stairs, sidewalks: execute the last finish using wooden trowel to obtain slightly rough surfaces without ridges or ripples.
- .3 The tolerance permitted in the finish, as defined by the CAN/CSA A23.1, is 8 mm to 3.00 meters.
- .4 Interior slabs of the building whose concrete remain exposed or will be covered with carpeting or flexible coating or roof slab: execute the last finish using trowels equipped with metal blades; pass these trowels several times and at appropriate intervals to obtain dense and perfectly smooth surfaces without imperfections.
- .5 The tolerance permitted in the finish, as defined by the CAN/CSA A23.1, is 5 mm to 3.00 meters.
- .6 When drawings or slips require floor finish with hardener, apply a non-metallic uncolored aggregate such as Diamag 7 Sika approved or an equivalent at the minimum rate of 5 kg per square meter and following manufacturer's instructions.
- .7 The floor where concrete surfaces remain exposed (without paint, carpet, tile or other finish) must receive after applying hardener and after curing of concrete, two coats of

sealer to minimize dust accumulation. This sealer must meet the requirements of CAN/CGSB-25.20 "Primer floors" of the following types as indicated on the drawings:

- .1 Flortec 22 clear or an approved equivalent.
- .2 Sikaguard Color A50 color "gray" or an approved equivalent.
- .3 Sikaguard Clear / Seal 2 or an approved equivalent.
- .4 71H Sikaguard or an approved equivalent.
- .5 Sikaguard Clearsel or an approved equivalent.

The first layer is applied after the concrete has cured, the second following a delay of 6 months to 12 months after the first application.

### **3.11 TREATMENT OF FORMED SURFACES**

- .1 Nests of pebbles spotted on the concrete surface at the time of stripping should not be repaired before the Professional has reviewed them and has accepted the corrective methods to be used.
- .2 Burrs, unsightly streaks and other irregularities on formed surfaces that remain exposed or that will receive a waterproofing membrane, must be removed within 24 hours after stripping. Holes left by the rods must also be closed at the same time.

### **3.12 CUTS, HOLES AND NOTCHES IN CURED CONCRETE**

- .1 It is never allowed for any reason whatsoever; to cut, drill hole or notch already cured concrete elements, unless the Professional has granted permission.
- .2 Any cut, hole or notch into the cured concrete authorized by the Professional must be performed in the exact place and according to the exact dimensions approved by him. Use rotary tools that prevent bursts.

### **3.13 TOLERANCES**

- .1 If tolerances specified by CAN/CSA A23.1 were not met during the construction of any element whatsoever shown on plans, the Professional may require that this element be demolished and rebuilt following the tolerances of that article, without additional cost to the Owner.

**END OF SECTION**

**PART 1 GENERAL**

1. No subject

**1.1. REFERENCES**

1. American Society for Testing and Materials International, (ASTM)
  1. ASTM A36/A36M (2014), Specification for Structural Steel.
  2. ASTM A193/A193M (2017), Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
  3. ASTM A307(2014), Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  4. ASTM A325(2004), Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  5. ASTM A325M (2004), Specification for High-Strength Bolts for Structural Steel Joints [Metric].
  6. ASTM A490M (2011), Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
2. Canadian General Standards Board (CGSB)
  1. CAN/CGSB-85.10 (1999), Protective coatings for metals.
3. Canadian Institute of Steel Construction (CISC)/ Canadian Paint and Coatings Association.
  1. ICCA/AFPC 1-73a (1973), Paint a quick-drying layer for structural steel.
  2. ICCA/AFPC 2-[75] (1975), Primer coat paint quick-drying for structural steel.
4. Canadian Standards Association (CSA)
  1. CAN/CSA-G40.20/G40.21 (2013), General requirements for laminated or welded structural steel.
  2. CAN/CSA-G164(2018), Hot galvanizing of irregularly shaped objects.
  3. CAN/CSA-S16 (2014), Limit States Design of Steel Structures.
  4. CAN/CSA-S136 (2016), Limit States Design of Steel.
  5. CSA-S136.1 (2016), Commentary on CSA Standard S136.
  6. CSA W47.1(2009), Certification of fusion welding companies of steel structures.
  7. CSA W48(2018), Filler metals and associated materials for arc welding.
  8. CSA W55.3(2008), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
  9. CSA W59(2013), Welded steel construction (arc welding) (metric units).
5. Master Painters Institute
  1. MPI-INT 5.1, Structural Steel and Metal Fabrications.

2. MPI-EXT 5.1, Structural Steel and Metal Fabrications.
6. The Society for Protective Coatings (SSPC)
  1. SSPC SP-6/NACE No. 3 (2007), Commercial Blast Cleaning

### **1.2. WORKSHOP DRAWINGS**

1. Submit to the Representative of ministry for approval complete and detailed shop drawings and erection of the steel frame to be executed.
2. Workshop and erection drawings shall contain all the information specified in 4.1 and 4.2 of CAN / CSA S16.1 and include the signature of the person who checked them before they were issued for approval. Drawings not verified by the Contractor will be refused and returned to the Contractor.
3. The drawings must include the signature and seal of the Engineer of the manufacturer who designed the assembly details and who is an active member of "l'Ordre des Ingénieurs du Québec".
4. In the case of the beams, the shop drawings must :
  1. Indicate the load calculations used and the cambers required to compensate for the loading under the dead weight;
  2. Supply the efforts of all the beam chords plus all the details relative to the supports, struts, etc. and also à list of materials required for the fabrication and assembly;
  3. Stamped and signed by an active engineer of "l'Ordre des Ingénieurs du Québec".
5. The title of the project and the names of the client, the professionals and the Contractor must appear on each shop and erection drawing.
6. The Contractor is authorized to use the engineering drawings, emitted for construction, as installation drawings, but must be replaced by the Contractor's drawing with the seal of the professional removed.
7. The installation drawings must be referenced to the contract number and to its subsequent engineering drawing.
8. The Contractor must not commence the fabrication of the framework elements prior to approval of the shop and erection drawings by the Representative of ministry.

### **1.3. ANCHORAGES IN CONCRETE**

1. The expanding shell, the chemical (epoxy), the masonry anchorings and the anchoring bolts to the column base are to be supplied by the Contractor.

### **1.4. ANCHORAGES TO MASONRY**

1. At points where the masonry partitions meet the steel columns, supply and install plates (25mm width x 300mm length x 400mm thickness) spaced at 600mm c/c. See the architect drawings for the location of the partitions.
2. At the tops of the masonry partitions, under the girders and beams and between the steel or concrete, supply and install the supports to the masonry walls. The supports will be made of 75mm X 75mm X 5mm angle irons 400mm length, placed at 1200mm c/c, alternately on each side of the wall.

### 1.5. QUALITY ASSURANCE

1. The Contractor must have a quality control (QC) program, in which must be approved by a Representative of ministry, generally in accordance with the ISO-9002 standard. The program must be submitted to the Representative of ministry.
2. Obtain the certificates emitted by the steel mill attesting that the chemical composition and the physical properties of the steel used prior to fabrication, and submit these documents to the Representative of ministry.
3. Conserve at the fabrication shop all the QC notes and the non-destructives tests data for examination by a Representative of ministry.
4. Prior to fabrication, submit for examination by a Representative of ministry the shop welding procedures. The site welding procedures must also be submitted.
5. The Representative of ministry reserves the right to inspect the Contractor's shop work and that of the Suppliers and Sub-contractors, during any time during work hours. The cooperation during the visits must be in accordance with the CAN/CSA- S16.1 Standards, clause 31.2.

## PART 2 PRODUCTS

### 2.1. MATERIALS

1. Laminated profiles or welded, plates and bars: in conformity with the specifications from the CAN/CSA-G40.20 and CAN/CSA-G40.21 standards. Use 350W grade steel, with the exception to the beam chords which can be 380W grade steel and the L and C profiles can be 300W grade steel.
2. Tubes: in conformity with the specifications from the CAN/CSA-G40.20 and CAN/CSA-G40.21 or ASTM A500 standards. Use 350W grade steel, class C, unless otherwise indicated on the drawings.
3. Anchor bolts: in conformity with the specifications from the ASTM A307 standard, unless otherwise indicated on the drawings.
4. High resistance bolts: in conformity with the specifications from the ASTM A325 standard.
5. Steel deck fixation with standard steel rockwell 55 HRC, with 5 micrometers of zinc in conformity with specifications of ASTM B633, SC1, type III.
6. Welding electrodes: in conformity with the specifications from the CAN/CSA W48 standard.
  1. One coat rapid drying paint: in conformity with the specifications from the 1-73a ICCA/AFPC standard, grey color. See article 3.6.
  2. Metallic deck: galvanized steel sheeting in conformity with the specifications from the ASTM A653M, SS grade 230. Use steel sheeting covered with one coat of zinc equivalent to Z275 from the ASTM A525M standard.

3. Hot emersion galvanization: according to indications, galvanized steel elements in conformity with the specifications from the CAN/CSA G164 standard, with at least 600 g/m<sup>2</sup> galvanization.

### **PART 3 EXECUTION**

#### **3.1. SITE VERIFICATION**

1. Verify all dimensions and elevations on site prior to commencing the fabrication of the framework elements. The verification must be conducted early enough as to avoid delays at the site.

#### **3.2. SUBSTITUTION**

1. All substitution of specified materials in articles 2 or to the profile sections indicated on the drawings must be approved in writing and written by a Representative of ministry. The Representative of ministry could demand that the calculations justifying the substitutions be submitted.

#### **3.3. FABRICATION**

1. Supply all new materials required.
2. Must be rigorously in conformity with the CAN/CSA-S16.1 standard as well as the details as shown on the shop drawings.
3. Adequately arch the beams for which a camber is specified on the drawings.
4. Close the open-end deep profiles with 6mm minimum end plates. Allow holes for inspection and flow.
5. Avoid forming in the steel framework water and dust receivers. Pierce drainage hole when required.
6. All elements where the fabrication tolerances were not observed or that represent poorly executed welding is subject to be rejected by the Representative of ministry.

#### **3.4. ASSEMBLY**

1. Design and calculate the assemblies in function of the forces, bending moments and cutting edges indicated on the drawings. In the case of the beams, the assemblies must be at least equivalent to those indicated in Tables 3-56 to 3-79, 9<sup>th</sup> édition, - revision 3 of the « Handbook of Steel Construction » published in 2007 by the Canadian Steel Construction Institute.
2. Moreover, the beam assemblies to their extremities must resist to at least 60% of the total uniformly fractures distributed load that can support the beam while supposing that the compressed base is laterally supported throughout the entire load. The end plates or the beam assembly angle irons will have at least a 8mm thickness and the welding chords at least 6mm.
3. Unless otherwise indicated on the drawings, all the shop executed assemblies must be welded. If bolted assemblies are specified, high resistance bolts must be used.

4. Unless otherwise indicated on the drawings, all the site executed assemblies must be diametrically pressure bolted, except for the rigid assemblies (that can resist to a moment) must be friction type using a  $k_s$  value = 0.33 and  $c_1 = 0.82$  and the appropriate cleaning. The Contractor can use superior values only if he can demonstrate to the Representative of ministry that the surfaces in contact at the time of assembly meet the requirements permitting the use of such values.
5. The assembly of the bracings must be conceived while supposing that limited ductile bracing framework that meets the requirements as per article 27.6 from the CAN/CSA-S16.1 standard.
6. The assembly of the bracings will be done with diametrical pressure while considering the calculated charges as per the requirements of article 27.5.3 from the CAN/CSA-S16.1 standard.
7. When the loads that must be transmitted are not indicated on the drawings, the weldings will be calculated in a manner as to be able to mobilize the full capacity of the elements that unit them.
8. The Contractor must submit to the Representative of ministry the calculation notes of all assemblies in which the design is subject to disagreement.
9. Before submitting the detailed shop drawings, submit for examination by the Representative of ministry, with the calculation verifies, signed and sealed by a licensed Engineer, the non-standard, offset or site welded assemblies.
10. The offset assemblies or situated on only one side of the web must not be used unless it is impossible to detail a symmetric assembly.

### **3.5. BEAMS**

1. Design and calculated the beams as a function of the loads and the spacing as indicated on the drawings. Conform to the notes as per the CAN/CSA-S16.1 standard
2. Conform to the indications supplied on the drawings relatively to the extension of the bottom chords and/or the top chords.
3. Unless otherwise required on the drawings, it is never permitted to pierce the bases of the top or bottom of a beam.
4. Unless otherwise indicated, the flex caused by the overburden must not exceed  $1/300$  of span for the roofs and  $1/360$  for the floors.
5. The camber must be equal to the flex under the dead load.

### **3.6. DELIVERY / HANDLING / STORAGE**

1. Load, transport and deliver the steel to the site. Take required precautions as to not damage the elements and the painted elements while handling and transportation.
2. See that the painted surface are not stacked face together, however separate them with wooded blocks, foam or other convenable materials.
3. Use nylon slings for lifting materials, and if required use appropriate spreaders or cradles.
4. Firmly attach the steel with chains and shims to the transport vehicules to avoid all horizontal mouvement. Protect the metallic edges with rubber, burlap or wood. Do not load small sections in packages inside large « U » shaped profiles or beams.

1. Unload at the selected site. Supply the material and manpower to conduct the loading without damage and place the pieces on wooden blocks supplied by the Contractor.
2. Adequately chose wooden block dimensions and space them correctly to avoid all contact with the stacked steel and the ground.

### **3.7. ERECTION**

1. The propose technique as well as the material used to erect the framework are subject to approval by the Representative of ministry. This approval does not free the Contractor of his entire responsibility with respect to the choice of the technique and the mobilization of the materials that will permit him to rapidly and safely execute his work.
2. Properly attach the bracing to the framework, the transversal linkage and bracing cables with sufficient resistance to support the loads due to windy conditions, as long as the installation of the final framework elements are not completed.
3. Leave the temporary bracing in place if the permanent stability of the construction depends on the subsequent work from other trades, until all this work is completed.
4. The framework must be erected in strict conformity with the prescriptions of article 30 from the CAN/CSA–S16.1 standard.
5. Report to the Representative of ministry as soon as possible all defects noted in the assembly of the elements fabricated in the shop and his decision to make corrections.
6. Straighten all lightly bent elements prior to site assembly and replace all elements that are damaged to the degree that their efficiency can be doubted by a Representative of ministry.
7. It is strictly forbidden to execute site assembly welding unless they are indicated on the shop drawings or that they have been pre-approved by a Representative of ministry.
8. Introduce metal wedges under the column bases in order to maintain them vertically and level while the filling mortar is curing.
9. It is strictly forbidden to pierce or torch cut or modify in any manner on the site an element of the framework without having prior written authorization by a Representative of ministry.
10. Once the erection works are completed, apply a coat of paint on the welds and bolted joints executed on the site, and touch-up the torched surfaces or scrapes incurred during the works.

### **3.8. METAL DECK**

1. The decking must be designed and fabricated according to the requirements from the CAN/CSA– S136 standard.
2. The decking must have a minimum steel sheeting thickness and profile thickness in conformity with the drawings and capable of supporting the loads as indicated on the drawings. The decking must have laterally interlocking surfaces and the floors must be high adherence type.
3. Store at the site and then erect the metal deck in conformity with the manufacturer's directives.
4. Erect the metal deck in a manner as to assure a continuity of at least 3 spans.

5. Join the top panels in a manner such their extremities overlap at least 50mm.
6. Unless otherwise indicated on the drawings, attach the panels to each metal frame support using washers and punctual 20mm arc welds with diameters placed at each groove according to the 914/7 weld pattern.
7. Unless otherwise indicated on the drawings, attach the panels to all supporting elements that are parallel to the each groove using washers and punctual 20mm arc welds with diameters placed at each groove according to the 914/7 weld diameter spaced at 900mm maximum.
8. In the case where the elements are no in contact with the decking (main support elements lower than the secondary supports) add a support (HSS 101.6 x 101.6 x 4.78 by 100 mm length, for example) between the deck and the support element in order to respect the 900mm weld spacing.
9. Mechanically connect the male and female sides of the panels adjacent to the intervals not exceeding 450mm, unless otherwise indicated on the drawings.
10. It is strictly forbidden to have at the site, any openings that are 150mm diameter or more or from the side without reinforcing the deck around these openings. The details of the reinforcements must be shown on the shop drawings and submitted to the Representative of ministry for approval.
11. Attach 75 mm x 75 mm x 6 mm support angles in front of the columns.
12. Once the deck is attached in its final position, touch-up with primer all surfaced that have been torched during welding.
13. Attach the groove closings at locations that must contain poured concrete according to the manufacturer's recommendations.

### **3.9. QUALITY CONTROL – SITE AND SHOP**

1. The Contractor will conduct all work applying a quality assurance program in general accordance with the ISO-9002 standard.
2. The Contractor must conduct non-destructive of the following welds :
  1. radiographic control of end-to-end welds ;
  2. magnetic powder vtests on chord welds;
3. Ultrasonic test of full-penetration on « T » weld. The tests will be conducted on randomly selected welds as follows:
  1. Chord welds: 5%
  2. Full-penetration shop welds: 25%
  3. Full-penetration site welds : 50%
4. If the defects exceed the limits as per the CSA W59 standard, conduct tests on the complete length of the weld. Conduct the repairs and test the repaired welds once again. If the defects in the repaired welds persist, repair again until acceptance is obtained. The repairs and additional testing are at The Contractor's expense.
5. In order to be acceptable, the welds must respect the criteria as per the CSA W59 standard.
  1. If the Representative of ministry deems appropriate, he could, to verify the quality control, the inspection and the Contractor's test, use an inspection

laboratory in which the services are retained by the Owner.

### **3.10. SHOP PAINTING**

1. All steel must have a coat of paint in accordance with the specifications from the 1-73a ICCA/AFPC standard on the surfaces of all the framework elements with the exception of those that will be in contact with concrete or must conserve their natural adherence in the interior of the assemblies by friction.
2. Bolt heads, washers and assembly nuts including all welded surfaces at the site or damaged must be painted or touched-up using the same painting system.
3. Conduct the described work at the sub-articles below at the shop and in strict conformity with the prescription in article 29 from the CAN/CSA-S16.1 standard.
4. Prior application of rapid-drying paint, all grease and oil must be removed in conformity with the SP1-63 SSPC standard (Cleaning with Solvents) and all steel must be cleaned according to an appropriate method as to eliminate rust, peeling, dirtying, the welding cleanser, etc. to a degree equivalent to the illustrated standard «DST 2» from the VIS-1 SSPC «Photographic color standards for the preparation of surfaces» standard. The use of an « anti-splatter » product is required for the apparent steel trellis post pieces, the round HSS posts, the bracings and the beam connections.
5. The paint must not be applied if the steel surface is humid due to rain or condensation or if the relative humidity exceeds 85% and if the ambient temperature risks to be below 5°C before the paint is dry enough for manipulation.
6. The paint can be applied when the temperature is above 15°C and when the steel surfaces are in the temperature range of 5°C to 35°C.
7. All paint works must be conducted according to the paint manufacturer's recommendations and requirements and according to the requirements indicated in the present document, and thus following the strictest requirements.

### **3.11. SITE PAINTING**

1. Unless otherwise indicated, touch-up with a coat of primer paint in conformity with the SSPC-SP-6 standard all damaged surfaces and those that were not painted in the shop. Apply the paint in conformity with the requirements of the CAN/CGSB 85.10 standard.

**END OF SECTION**

**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 The related general requirements apply to the works as described in the following sections.
- .2 Management and disposal of construction / demolition waste - Section 01 74 21.
- .3 Drilled piles anchored by injection - Section 31 63 19.
- .4 Unfilled tubular steel piles Pile tests - Section 31 62 16.19.
- .5 Submittal procedures- Section 01 33 00

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM), latest editions
  - .1 ASTM D1143 (2013), Standard Test Method for Piles Under Static Axial Compressive Load.
  - .2 ASTM D4945(2017), Standard Test Method for High-Strain Dynamic Testing of Piles.

**1.3 DOCUMENTS / SAMPLES TO SUBMIT FOR APPROVAL / INFORMATION**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal procedures.
- .2 Submit 2 weeks before testing, outline of test method to be employed as specified and include drawings showing details of test set up.
- .3 Quality assurance submittals:
  - .1 Test reports: submit 3 copies of test reports for piles from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

**PART 2 PRODUCTS****2.1 MATERIALS**

- .1 No subject.

**PART 3 EXECUTION****3.1 GENERAL**

- .1 Allowable design load capacity of pile at specified load as indicated on foundations plans.
- .2 2 weeks before testing, provide Ministry Representative with outline of test method to be employed in accordance with ASTM D1143 or ASTM D4945.
  - .1 Include drawings showing details of test set up.
- .3 Supply and erect equipment and temporary structures necessary for making tests.
- .4 Ministry Representative to select piles for testing during performance of Work.

- .5 Test to be performed in presence of Ministry Representative.
- .6 Provide shelter, enclosures and lighting for observation, testing and recording of data.

### **3.2 TESTING**

- .1 Do compression pile tests and prepare reports in accordance with ASTM D1143 except as specified.
- .2 Do dynamic tests and prepare reports in accordance with ASTM D4945 except as specified.
- .3 Test 2 days after placement of test pile.
- .4 Remove apparatus and equipment on completion of test.
- .5 provide test report in 3 copies, in accordance with ASTM D1143 except as specified.

### **3.3 TEST EVALUATION**

- .1 Qualified geotechnical engineer to interpret results for predicting pile performance and capacity.
- .2 If pile fails load test, do additional tests according to requirements provided by Ministry Representative.
- .3 Test validity is determined by Ministry Representative.

**END OF SECTION**

**Part 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 General requirements apply to the work described in this section
- .2 Section 01 74 21 - Construction-demolition waste management and disposal
- .3 Geotechnical study:
  - .1 See Appendix A.

**1.2 DEFINITIONS**

- .1 No subject

**1.3 REFERENCES**

- .1 ASTM C117 (2017), Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136 (2014), Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D422 (2007), Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D698 (2012), Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
- .5 ASTM D1557 (2012), Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
- .6 ASTM D4318 (2017), Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .7 CSA A23.1 - A.23.2 (2016): "Concrete materials and methods of concrete construction, test methods and standard practices for concrete"

**1.4 GENERAL REQUIREMENTS**

- .1 Work site visit with terrain topography examination: natural and artificial obstacles, access roads and other local conditions that could affect the execution of such work.
- .2 Comply with provincial and municipal regulations governing the execution of the work described in this section of the estimate, especially those related to environmental protection and shoring of excavations.
- .3 The work is governed by a waste management plan in accordance with Section 01 74 21 - Construction-demolition waste management and disposal. The work of this section must

be carried out respecting the requirements of the plan which will be implemented by the Contractor. All subcontractors must comply.

### **1.5 SOIL TYPE**

- .1 Geotechnical study report, near the land where the work will be performed, must be annexed to the contract documents of the Contractor.

### **1.6 LINES AND LEVELS**

- .1 Prior to the start of works, position and fix all landmark terminal required for locating and delimiting the area and depth of the excavations that will be executed.
- .2 Replace or immediately rectify any landmark terminal that has been removed or moved before the excavation and concrete work for which it is required have been completed and approved by the Ministry representative

### **1.7 PERMITS AND REGULATIONS**

- .1 The Contractor must obtain all necessary permits. The Contractor must comply with all laws and regulations in force and in particular those related to the use of explosives, shoring of the excavation and protection of the environment.

### **1.8 PROTECTION OF PUBLIC SERVICES AND STRUCTURES**

- .1 The Contractor must take good care of all utilities (water, sewer, gas, electricity, telephone, sidewalks, paving, etc.) underground or elevated that his work can affect. All utilities have the support and protection required. These utilities may belong to private companies or public bodies.
- .2 The Contractor is responsible for any damage that may happen to them as a result of construction operations. He must make the necessary checks with public bodies, private companies that own the damaged utility. The location of the pipes on the plans is generally rough and field audits should be conducted to accurately locate underground services.
- .3 If necessary, excavation near conduits and underground structures must be made by hand. These conduits and underground structures should not be backfilled before the Ministry representative has inspected them.
- .4 Pavement or sidewalks must be sawn to the boundary of the excavation prior to the actual excavation work. It is not allowed to break a pavement, a curb or sidewalk using the bucket of an excavating machine or with another similar method.

### **1.9 EXISTING PERIPHERAL STRUCTURES**

- .1 Take every precaution to avoid damaging the landscaping, buildings and other man-made structures on the periphery of the site. If necessary, make all repairs to the satisfaction of the Ministry and assume all costs.
- .2 Before starting work, accompanied by the Ministry and the Contractor's insurer, make a complete inspection of buildings and other surrounding structures that could be damaged during the execution of the work. If necessary, submit to the Ministry representative, a

written report including photos or a video showing all existing defect that has been identified and could possibly be the subject of a claim for damages.

#### **1.10 BUILDING MAINTENANCE**

- .1 Prevent airborne dust on site and avoid burning combustible debris from the excavation or demolition or any other source.
- .2 The removal of undesirable materials must be done every day.
- .3 Avoid pile up of debris in places where they can threaten the stability of excavation slopes or restrain the natural drainage of the work site.
- .4 Protect the excavation slope against erosion, landslides and other phenomena of natural or accidental source that may damage or delay the normal progress of work.

#### **1.11 SECURITY MEASURES**

- .1 Strictly comply with the requirements of Article 3.15: Excavations and trenches of the Safety Code for the construction work, 2.1 S, r.6 published by the Québec Official Publisher.

#### **1.12 WORK SUPERVISION**

- .1 Ministry representative will conduct an evaluation of soil quality at the bottom of excavations and evaluation of foundation embankments quality. The Contractor must at all times cooperate with the Ministry representative and make available equipment on site so that he can quickly and effectively perform his job. The Contractor must cooperate during backfilling to allow the Ministry representative to verify the compactness of the materials used and their quality.
- .2 The Contractor must not claim any supplement to contract amount because of delays caused by the Ministry representative intervention to carry out its quality control work during the execution of backfilling.

#### **1.13 AUTHORIZATION OR APPROVAL OF THE MINISTRY REPRESENTATIVE**

- .1 In accordance with the requirements of this section, the permission or approval of the Ministry representative must not be regarded as having been obtained until he has been notified in writing or recorded in the minutes ratified by all persons attending meeting and where Ministry representative was also attending.
- .2 The Ministry representative may delegate a laboratory to represent him in evaluation in regard to the quality of materials and work. The laboratory is, as such, empowered to issue directives to which the Contractor must comply.

### **Part 2 PRODUCTS**

#### **2.1 ORIGIN AND APPROVAL OF MATERIALS**

- .1 Before starting work, the Contractor must inform the Ministry representative of the origin of borrowed materials he intends to use.

- .2 The Contractor must provide recent reports of particle size analysis and qualitative testing, performed by a recognized laboratory, certifying that all materials meet the requirements of the quote.
- .3 Ministry representative reserves the right to perform at the Ministry's expense, by a recognized laboratory, particle size analysis and qualitative tests certifying that all materials meet the specification requirements and the Contractor must cooperate to provide required samples.
- .4 Borrowed materials must not contain anything likely to swell.
- .5 The Contractor must not use any material before it is approved in writing by the Ministry representative

## 2.2 GRANULAR MATERIALS

### .1 Quality

At least 95% of the results of tests conducted by a laboratory or laboratories must meet the following specifications:

<b>Trials</b>	<b>Granual Material</b>	<b>Granual Material</b>	<b>Sand or gravel</b>
Petrographic max. number	200	300	400
Durability MgSO4 (% max.)	20	25	35
Los Angeles (% max.)	50	50	50
Micro-Deval (% max.)	33	36	45
Fragmentation (% min.)	50	50	-
Organic materials (% max.)	0,8	0,8	0,8

#### .1 Petrographic number

BNQ-2560-900 "Determination of petrographic number of coarse aggregate"; the maximum is 175 instead of 200 in the case of a non-paved road surface.

#### .2 Durability

BNQ-2560-450 "Aggregates - Determination of resistance to disintegration by a magnesium sulfate solution" (5 cycles); specified losses apply respectively to the coarse aggregate and fine aggregate.

- .3 Los Angeles  
BNQ-2560-400 "Aggregates - Determination of abrasion resistance using the device Los Angeles"; the maximum is 32 instead of 50, in the case of crushed stone from limestone quarries.
- .4 Micro-Deval  
BNQ-2560-070 "Aggregates - Determination of the wear by attrition coefficient using the Micro-Deval apparatus"; the maximum is 30 instead of 33 in the case of a layer of unpaved rolling.
- .5 Fragmentation  
The percentage shown is the percentage by weight of comminuted particles having at least one face fractured by crushing and retained on the sieve of 5 mm.
- .6 Organic materials  
The standard test is based on the book "aggregates Technology" on page 329, ed. 1983 (Aitcin, Jolicoeur and Mercier).
- .7 Standards  
The standard testings BNQ 2560-900-and-BNQ 2560-450 are replaced by the BNQ 2560-070-standard for aggregates from limestone quarries.

.2 Granulometry

- .1 Crushed stone MG 56 (60-0) (complying with NQ Standard 2560-114, Civil Works - aggregates)

Sieve	Percentage passing (% weight)
80,00 mm	100
56,00 mm	82-100
31,50 mm	55-85
5,00 mm	25-50
1,25 mm	11-30
0,325 mm	4-18
0,080 mm	2-7

- .2 Crushed stone MG 20 (20-0) (complying with NQ Standard 2560-114, Civil Works - aggregates)

Sieve	Percentage passing (% weight)
31,50 mm	100
20,00 mm	90-100
14,00 mm	68-93
5,00 mm	35-60
1,25 mm	19-38
0,325 mm	9-17
0,080 mm	2-7

- .3 Crushed stone BC 5-20

Sieve	Percentage passing (% weight)
28,0 mm	100
20,0 mm	90-100
10,0 mm	25-60
5,0 mm	0-10
2,5 mm	0-5

- .4 Sand or gravel

Sieve	Percentage passing (% weight)
31,5 mm	100
5,0 mm	35-100
0,080 mm	0-10

- .5 Slurry

Sieve	Percentage passing (% weight)
9,5 mm	100
5,0 mm	93-100
2,0 mm	70-100
0,4 mm	15-57
0,080 mm	0-17

.6 Geotextile

1. geotextiles must be rot-proof, insensitive to the action of acids and bases and unassailable by microorganisms and insects, and must meet the following requirements:

<b>Trials</b>	<b>Requirements</b>	<b>Standards</b>
Tensile strength in length and minimum width (N)	350	CAN / CGSB – 4.2 – 12.2
Bursting strength (Mullen) minimum (kPa)	2200	CAN / CGSB – 4.2 – 11.1
Minimum tensile force (N)	750	CAN / CGSB – 4.2 - 9.2
Minimum thickness	2 mm	CAN / CGSB – 4.2 – 37

1. Peripheral drain

1. The corrugated and perforated thermoplastic conduits must comply with the following requirements:
  1. Conduits of 100 mm, 150 mm, 200 mm and 250 mm in HDPE compliant to BNQ 3624-122, class 400.
  2. Conduits of 300 mm in HDPE compliant to BNQ 3624-110, class 300.

**Part 3 EXECUTION**

**3.1 FOUNDATION AREA**

- .1 The bottom of the excavation must be cleaned by hand. Foundation bedding must be horizontal but may form several levels separated by siding as vertical as possible.
- .2 Any excavation deeper than what is shown on the drawings is the responsibility of the Contractor as well as the measures determined by the Ministry representative to correct the situation.
- .3 The Contractor must take the necessary precautions to prevent softening of natural soil under foundations and embankments. If in regard to the Ministry representative's opinion, the bedding becomes unsuitable, the Contractor must further excavate to achieve an acceptable support. The additional excavation and incidental remedies are made at the expense of the Contractor.
- .4 The Contractor is not allowed to excavate to a depth greater than what is specified in the drawings; if doubtful soil is discovered during the inspection of the Ministry representative and/or the laboratory, he will notify in writing of the solution.

**3.2 EXCAVATION**

- .1 Take the necessary precautions not to disturb soil below the level of pile heads, footings, slabs on ground or other structure. Remove any disturb soil from bedding.

- .2 Immediately remove from site, all excavated material that will not be reused.

### **3.3 EXCAVATION FOR SLABS ON GROUND AND PAVED SURFACES**

- .1 Unless otherwise specified, the Contractor must make the necessary excavations to avoid setting up compacted granular backfill on organic soil or topsoil. Bedding must be natural ground, undisturbed, free of organic matter and also accepted by the Ministry representative. The excavation will be deep enough to allow the establishment of granular backfill thickness specified on the drawings.
- .2 Refer to section 3.9 for additional information concerning the slabs on ground and paved surfaces.

### **3.4 DRYDOWN OF EXCAVATIONS**

- .1 If necessary, build and maintain in operation an adequate network of ditches connected to header tanks. The location of such tanks must be approved by the Ministry representative.
- .2 Install in the working collection pits and pumps with sufficient capacity to quickly drain the water that accumulates.
- .3 The Contractor must, at its expense, maintain excavations free of water, snow and ice as long as they have not been backfilled.

### **3.5 REMOVAL OF EXCAVATED MATERIAL**

- .1 Immediately remove from site, all excavated material that will not be reused later as backfill.
- .2 It is prohibited to file or store excavation material on pavement, sidewalks, alleys, on any other public property, or already built structures.

### **3.6 DRAINAGE**

- .1 The Contractor must provide and arrange ditches for pumps, drains, pipes and all other means necessary to remove water from trenches, excavations and other parts of the work and must, where necessary, evacuate all surface and ground waters, whether from natural sources, seepage, leakage or flow of sewage pipes, drains or other man-made structures.
- .2 The Contractor must also keep dry excavations and other portions of the work until the permanent works of drainage to be built is completed.
- .3 The Contractor must properly control, divert and evacuate all surface water that may enter the locations where the work is performed under contract until provisional acceptance.

### **3.7 PROTECTION AGAINST FROST**

- .1 If work is performed in cold weather, make sure the excavations as soon as they are completed, are effectively protected against freezing in order to build on unfrozen ground, free of snow and ice and to avoid damage by frost effect to the already built or neighboring structures; cover the bottom with an insulating material of suitable thickness or use any other method approved by the Ministry representative.

- .2 The Contractor must, at his expense, protect against frost excavations until the pile heads, stringers, walls and similar elements have been completely casted and backfilled.

### **3.8 INSPECTION AND ACCEPTANCE**

- .1 Before casting or backfilling, the Contractor must ensure that the Ministry representative or the laboratory has inspected and accepted the subgrade and the works that will be hidden by the embankment or the structural elements.
- .2 The Contractor must notify the Ministry representative at least 24 hours before the backfill of any material; the Contractor must provide his cooperation to facilitate the inspection.

### **3.9 CONSTRUCTION OF EMBANKMENTS**

- .1 Backfill materials must be implemented in a way that no exaggerated effort or damage will be caused to works.
- .2 When backfilling is necessary on either side of a foundation wall, it must be made simultaneously on both sides.
- .3 Where the filling on one side, it must be done only after all elements that ensure stability of the wall are in place.
- .4 Before backfilling, the Contractor must ensure that the Ministry representative has inspected and accepted the subgrade and the works that will be hidden by the embankment.
- .5 When work begins, check that the surfaces to backfill remained clean, dry and free of snow and ice and there was no softening or subsequent soil disturbance; it is prohibited to build embankments on the frozen ground.
- .6 Ensure that backfill material is not frozen and contains neither snow nor ice, and debris.
- .7 The materials must be deposited in layers of up to 300 mm thick. Each layer must be densified separately using mechanical devices capable of providing the specified densities.
- .8 The cover over and around conduits should be done with care so that no damage or movement is caused to conduits and prevent thereafter, sagging of the slab, floor or other structure located above.
- .9 All conduits buried within the works, backfill from minimum 150 mm under the grade of the pipe to the height of the axis with sand or gravel dust. Backfill the remainder of the excavation with a granular material, crushed stone, complying with the abovementioned standards, compacted to the specified density.
- .10 If devices or other drains are requested on the plans, backfilling around these drains, 50 mm below 200 mm on each side and 300 mm above, must be made of crushed stone, clean, consistent with caliber BC 5-20 from Ministry of Transportation.
- .11 Unless otherwise stated in the drawings, the embankment immediately below the slab on grade or under the asphalt will have a minimum thickness of 150 mm and will be crushed stone caliber 20 MG

- .12 The soil to be compacted must achieve a minimum density of 95% according to Proctor changed in the last 150 mm from the upper layer.
- .13 After densification, the sand borrowed material, gravel or crushed stone must reach a density of 95% following the modified Proctor test (ASTM D-1557), the entire thickness of each layer, unless indications contrary to the plans.

### **3.10 OTHER BACKFILLING WORK**

- .1 Other backfilling work includes all those required outside of the foundation walls.
- .2 As the space above the trenches of the peripheral walls or other trenches must be paved, underlying embankments, from the undisturbed natural ground, must be made as those inside, if not otherwise indicated on landscaping plans.

### **3.11 POSITIONNING OF GEOTEXTILE**

- .1 Where indicated on drawings, position a geotextile membrane and take the necessary steps to keep it in position until the embankment is added.
- .2 Overlap geotextile joints to a length of 1000 mm.

### **3.12 COMPACTION TESTS**

- .1 The Ministry may perform compaction tests. The cost of these tests is paid for by the Ministry.
- .2 This inspection does not relieve any responsibility of the Contractor of his obligations to perform the work according to the plans and specifications; it is not a guarantee that they were executed according to plans and specifications.

**END OF SECTION**

**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 The related general requirements apply to the works as described in the following sections.
- .2 Management and disposal of construction / demolition waste - Section 01 74 21.
- .3 Drilled piles anchored by injection - Section 31 63 19.
- .4 Pile tests - Section 31 09 16.28.
- .5 Submittal Procedures- Section 01 33 00
- .6 Concrete reinforcing- Section 03 20 00
- .7 Cast-in-place concrete- Section 03 30 00 –

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International), latest editions
  - .1 CSA-G40.20/G40.21 (2013), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W47.1 (2009), Certification of Companies for Fusion Welding of Steel Structures.
  - .3 CSA W48 (2018), Filler Metals and Allied Materials for Metal Arc Welding.
  - .4 CSA W59 (2018), Welded Steel Construction (Metal Arc Welding) (metric version).
  - .5 CSA W186 (1990), Welding of Reinforcing Bars in Reinforced Concrete Construction.
  - .6 CSA-Z245.1 (2018), Steel Pipe.
  - .7 ASTM A252 (2010), Standard Specification for Welded and Seamless Steel Pipe Piles
  - .8 ASTM A106/ASTM A106M (2018), Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
- .2 The Master Painters Institute/MPI ASM, Architectural Painting Specification Manual.
  - .1 MPI #19, Inorganic Zinc Rich Primer.
- .3 The Society for Protective Coatings (SSPC)
  - .1 SSPC Painting Manual, Volume 2, Systems and Specifications.
    - .1 SSPC-SP2 (2004), Hand Tool Cleaning.
    - .2 SSPC-SP3 (2004), Power Tool Cleaning.
    - .3 SSPC-SP5/NACE No.1(2007), White Metal Blast Cleaning.
    - .4 SSPC-SP6/NACE No.3(2007), Commercial Blast Cleaning.
    - .5 SSPC-SP7/NACE No.4(2007), Brush-Off Blast Cleaning.
    - .6 SSPC-SP8(2004), Pickling.

- .7 SSPC-SP10/NACE No.2 (2007), Near-White Blast Cleaning.

### **1.3 DOCUMENTS / SAMPLES TO BE APPROVED / INFORMATION**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Submit shop drawings and indicate: splice detail.
  - .1 Each drawing stamped and signed by professional engineer registered or licensed in Province of Quebec.
- .4 Quality Assurance:
  - .1 Prior to fabrication, and, if requested, provide Ministry representative with 2 copies of steel producer's certificates in accordance with ASTM A252.
  - .2 One Charpy V-notch test required per heat and results reported to Ministry representative by manufacturer.
  - .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Submit details of pile stock material to be used, as described in PART 3 - FABRICATION, for review by Ministry representative.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle in accordance written manufacturer's instructions.
- .2 Deliver new, undamaged materials to site, accompanied by certified test reports, with manufacturer's logo and mill identification mark provided on pipe piling.
- .3 Storage and Protection:
  - .1 Store and handle pipe piling in accordance with manufacturer's written instructions to prevent permanent deflection, distortion or damage to interlocks.
  - .2 Support pipe piling on level blocks or racks spaced not more than 3 m apart and not more than 0.60 m from ends.
  - .3 Store pipe piling to facilitate required inspection activities and prevent damage to coatings and corrosion prior to installation.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Steel pipe, of sizes and wall thicknesses indicated cut ends to requirements of API SPEC 5L.
- .2 Pipe material to have following minimum properties:
  - .1 Conventional elasticity limit: 241 MPa.
  - .2 Weldable steel: to ASTM A106/ASTM A106M carbon equivalent less than 0.55%.

- .3 Pipe allowable tolerances:
  - .1 Deviation from straight line, specified diameter, wall thickness and out-of-roundness on body of pipe and at pipe ends to conform to API SPEC 5L.
  - .2 Pipe to be checked for deviations before leaving mill.
- .4 Joints: Grade M300, category WT, according to CSA-G40.20/G40.21.
- .5 Welding electrodes: to CSA W48 series.
- .6 Concrete: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .7 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing, sizes and details as indicated.

### **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 FABRICATION**

- .1 Fabricate full length piles to eliminate splicing during installation wherever possible.
- .2 Full length piles may be fabricated from piling material by splicing lengths together.
  - .1 Use complete joint penetration groove welds for splices.
- .3 Submit details of planned use of pile material stock to Ministry representative for approval prior to start of fabrication. Re-use cut-off lengths as directed by Ministry representative.
- .4 Allowable tolerance on axial alignment to be 0.25% as measured by 3 m straight edge.
- .5 Allowable deviation from straight line over total length of fabricated pile to be 50 mm.
- .6 Repair defective welds as approved by Ministry representative.
  - .1 Repairs: to CSA W59.
  - .2 Unauthorized weld repairs may be rejected.
- .7 Repair damaged exterior protective coating of piles.

#### **3.3 PAINTING AND COATING**

- .1 Painting requirements include surface preparation of outer surfaces of piling, application of inorganic zinc coating and coal tar epoxy coatings and touch-up after delivery if necessary.
- .2 Do not paint portions of pile, which are to be encased in concrete.
- .3 Paint piles as specified by Ministry representative.
- .4 Surface preparation:
  - .1 Sand or grit blast in accordance with SSPC-SP3.

- .2 When blasting is completed remove dust by brush or vacuum prior to painting.
- .3 Remove oil, grease or organic matter, with approved solvents or detergents prior to painting.
- .4 Apply first coat of paint same day as completion of sand or grit blasting.
- .5 Application:
  - .1 Apply three (3) coats, each in accordance with manufacturer's recommendations.
  - .2 First coat, inorganic zinc: apply to average 75 micrometres dry-film thickness and minimum 65 micrometres thickness.
  - .3 Second and third coats: coal tar epoxy; apply to average single coat dry-film thickness of 180 micrometres.
  - .4 Painted surfaces to be free from sags and runs.

### 3.4 INSTALLATION

- .1 If approved by Ministry representative, splice piles in place during installation by welding.
  - .1 To prevent distortion, tack opposite points first and then weld opposite sections for pipe walls thinner than 10 mm weld against a back up ring. Hold members in alignment during splicing operation.
  - .2 Make splice by complete joint penetration groove welds as indicated on shop drawings.
- .2 Perform internal visual inspection of steel pipe, joints and base prior to placing of concrete.
  - .1 Ensure pipe inside is free from foreign matter.
- .3 Assemble and install reinforcement cages as indicated.
- .4 Install concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .5 Fill steel pipe pile with concrete using methods to limit free fall and to prevent segregation. Ensure adequate vibration to completely fill cross section of pipe.
  - .1 Ensure adequate vibration to completely fill cross section of pipe.
- .6 Set dowels in concrete in accordance with details as indicated.
  - .1 Secure until concrete is set.
- .7 Install pile caps as indicated.
- .8 Install driving shoes as part of field work.
- .9 Touch up scratched or uncoated surfaces with three (3) applications of inorganic zinc coating and coal tar epoxy, as required by Ministry representative.

### 3.5 WELDING

- .1 Weld to CSA W59.
- .2 Welding certification of companies: to CSA W47.1.

- .3 Welding certification of companies welding steel reinforcing bars placed in reinforced concrete: in accordance with CSA W186.

**END OF SECTION**

**Part 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 The related requirements apply to the described works in the following sections.
- .2 Management and disposal of construction and demolition waste - Section 01 74 21.
- .3 Steel tube piles – Section 31 62 16.19
- .4 Pile tests - Section 31 09 16.28.
- .5 Submittal Procedures- Section 01 33 00
- .6 Common Product Requirements- Section 01 61 00
- .7 Concrete reinforcing- Section 03 20 00
- .8 Cast-in-place concrete- Section 03 30 00 –
- .9

**1.2 REFERENCES**

- .1 ASTM International, latest editions
  - .1 ASTM A53/A53M (2012), Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A252 (2010), Standard Specification for Welded and Seamless Steel Pipe Piles.
  - .3 ASTM A1008/A1008M (2016), Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- .2 CSA International, latest editions
  - .1 CSA A23.1/A23.2, (2016) Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CSA G30.18 (2009), Carbon and Steel Bars for Concrete Reinforcement.
  - .3 CSA G40.20/G40.21 (2013), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .4 CSA S16 (2014), Design of Steel Structures.
  - .5 CSA W59 (2018), Welded Steel Construction (Metal Arc Welding).

**1.3 DOCUMENTS / SAMPLES TO SUBMIT FOR APPROVAL / INFORMATION**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for piles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
- .4 Field Quality Control Submittals:
  - .1 Maintain field driving records for each shell, including elevation of bedrock, driven depth of pile and rock socket depth, cut-off elevation of shell and protruding core.
  - .2 Provide Ministry Representative with three copies of field records.
  - .3 Submit detailed method statement and procedures for controlling and monitoring verticality and alignment of piles before starting pile installation.
  - .4 Submit mill report and results of concrete tests.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Store and protect piles from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

### **PART 2 PRODUCTS**

#### **2.1 MATERIALS**

- .1 Welded straight steel pipe caisson shell to diameters and wall thickness as indicated, plain ends, to ASTM A252.
- .2 Straight seamless and welded steel pipe: to ASTM A53, formed from flat plate to diameters and wall thickness as indicated.
- .3 High carbon steel pile shoe: to ASTM A53, welded to bottom of first pipe shell.
- .4 Wide welded plate sleeves: to ASTM A1008/A1008M, and as indicated, external 300 mm forming connections between lengths of steel pipe shell formed from flat plate.
- .5 Welding materials: to CSA W59.
- .6 Concrete mixtures and materials: to CSA A23.1/A23.2, Section 03 30 00 - Cast-in-Place Concrete.
- .7 Grout: to Section 03 30 00 - Cast-in-Place Concrete.
- .8 Reinforcing steel: to CSA G30.18, Section 03 20 00 - Concrete Reinforcing.
- .9 Steel core sections: to CSA G40.20/G40.21.

#### **2.2 SOURCE QUALITY CONTROL**

- .1 Mill report: to CSA S16.

- .2 Concrete tests: to CSA A23.1/A23.2.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pile installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Ministry Representative.
  - .2 Inform Ministry Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Ministry Representative.

#### **3.2 STEEL ARMATURE**

- .1 Prepare caisson shells with sufficient rigidity to avoid any damage or deformation during handling.
  - .1 If the armature is made of more than one segment, the bars must be sufficiently long to be able to cover the splices
  - .2 The splices to be covered must be done by welding.
- .2 Weld Tie-rods to main steel reinforcements.
- .3 Splice weld must be accredited by Canadian Welding Bureau (CWB).

#### **3.3 CONCRETE PLACEMENT**

- .1 Concrete and placement methods: to CSA A23.1/A23.2, Section 03 30 00 - Cast-in-Place Concrete.
- .2 Complete placing of concrete to required elevation within shell as approved in writing by Ministry Representative.
- .3 Cut off top of shell neatly and squarely at elevations as indicated.
- .4 Protect steel reinforcement core projecting above concrete in caisson.

#### **3.4 DEFECTIVE CAISSONS**

- .1 Replace, repair or modify caissons in accordance with written instructions from Ministry Representative.
- .2 Defective pile to be cut off at elevation as directed by Ministry Representative and filled with sand.

#### **3.5 LOAD TESTING**

- .1 Test pile in accordance with Section 31 09 16.28 - Pile Tests. Test pile will be used to confirm pile load capacity.

- .2 Piles driven before completion of satisfactory confirmation test on test piles will be at Contractor's risk.

**END OF SECTION**