

# **TENDER DOCUMENTS**

## **SUBSECTION 6.84 CONCRETE CURBS, GORES AND PROTECTIVE COVERS**

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## SUBSECTION 6.84 CONCRETE CURBS, GORES AND PROTECTIVE COVERS

### 6.84.1 GENERAL

- 6.84.1.1 This subsection describes the requirements relating to the concrete curb, gore and protective cover works covered by this Contract.
- 6.84.1.2 Any specific requirements pertaining to the concrete curbs, gores and protective covers covered by this Contract are set out on the plans and in Section 4 *Special Technical Conditions*.
- 6.84.1.3 The requirements relating to formwork are set out in subsection 6.32 *Formwork*.
- 6.84.1.4 The requirements relating to concrete work are set out in subsection 6.33 *Cast-in-Place Concrete*.
- 6.84.1.5 The requirements relating to excavation work are set out in subsection 6.87 *Earthworks*.

### 6.84.2 MEASUREMENT UNITS

- 6.84.2.1 The measurement units and respective symbols thereof used in this subsection are described as follows:

Measurement Unit	Designation	Symbol
length	meter	m
length	millimeter	mm
area	square meter	m <sup>2</sup>
volume	cubic meter	m <sup>3</sup>
volume	litre	L
stress, pressure	megapascal	MPa
force	kilonewton	kN
mass	kilogram	kg
temperature	Celsius degree	°C

### 6.84.3 REFERENCE STANDARDS

- 6.84.3.1 The Contractor shall carry out all concrete curb, gore and protective cover works in accordance with the requirements of the following standards and documents, to which the provisions of this Contract are added:

6.84.3.1.1 (ASTM) ASTM International:

- ASTM C309 *Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete;*

- ASTM D1751 *Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types)*.

6.84.3.1.2 (BNQ) Bureau de normalisation du Québec:

- BNQ 2501-255 *Sols – Détermination de la relation teneur en eau-masse volumique – Essai avec énergie de compactage modifiée (2 700 kN.m/m<sup>3</sup>)*;
- BNQ 2560-114 *Travaux de génie civil – Granulats, Partie II : Fondation, sous-fondation, couche de roulement et accotement*.

6.84.3.1.3 Ministère des Transports du Québec (MTQ):

- MTQ – *Cahier des charges et devis généraux (CCDG) – Construction et réparation*;
- MTQ *Ouvrages routiers – Tome II Construction routière, Chapitre 4 – Bordures et Chapitre 5 – Musoirs*;
- MTQ – *Ouvrages routiers – Tome IV Abords de route, Chapitre 8 – Revêtements de protection*;
- MTQ – *Ouvrages routiers – Tome VII Matériaux, Chapitre 3 – Bétons et produits connexes* :
  - Norme 3101 - *Bétons de masse volumique normale*;
  - Norme 3501 – *Matériaux de cure*.
- MTQ – *Ouvrages routiers – Tome VII Matériaux, Chapitre 5 - Armatures*;
  - Norme 5101 – *Acier d'armature*.

## 6.84.4 MATERIALS

### 6.84.4.1 GRANULAR MATERIALS

6.84.4.1.1 Granular materials shall comply with indications on the plans and with standard BNQ 2560-114 *Partie II* after implementation.

### 6.84.4.2 CAST-IN-PLACE OR MOLDED-IN-PLACE CONCRETE

6.84.4.2.1 Normal-density cement concrete shall comply with the properties of the mix indicated on the plans and in subsection 6.33 *Cast-in-Place Concrete*.

#### 6.84.4.3 CURING MATERIAL

6.84.4.3.1 The curing material shall have the properties indicated on the plans and in subsection 6.33 *Cast-in-Place Concrete*.

6.84.4.3.2 When a membrane-forming curing material is used, it shall be white pigmented (Type 2).

#### 6.84.4.4 CONCRETE PROTECTIVE COVER REINFORCING STEEL

6.84.4.4.1 The reinforcing steel shall comply with the plans and with subsection 6.31 *Reinforcing Steel for Concrete*.

#### 6.84.4.5 ASPHALTIC BOARD

6.84.4.5.1 The asphaltic board at the expansion joints of the concrete protective cover shall comply with standard ASTM D1751.

### 6.84.5 EXECUTION OF WORK

#### 6.84.5.1 SURFACE PREPARATION FOR CONSTRUCTION

6.84.5.1.1 The surface on which the granular base is placed for the construction of a curb, gore or protective cover shall be uniform, free of depressions and compliant with the profile indicated on the plans. The Contractor shall ensure that the surface is well drained, stable and compacted in accordance with the requirements before placing the granular material base.

6.84.5.1.2 The base materials shall be densified to a minimum of 95 % of the maximum dry density determined according to method BNQ 2501-255 or according to a trial section.

#### 6.84.5.2 CAST-IN-PLACE CURBS AND GORES

##### 6.84.5.2.1 General

6.84.5.2.1.1 The Contractor shall perform the cast-in-place curb and gore works in accordance with the indications on the plans.

6.84.5.2.1.2 The cast-in-place curbs and gores shall not deviate by more than 6 mm from the alignment and profile indicated on the plans. Any section that presents irregularities exceeding 5 mm within a 3 m surface area shall be redone at the expense of the Contractor.

6.84.5.2.1.3 The transitions between different types of curbs (lowered, levelled, etc.) shall be performed over a length of 1 m.

- 6.84.5.2.2 Concrete
- 6.84.5.2.2.1 The formwork shall remain in place for a period of twenty-four (24) hours after concrete placement or until the concrete has reached the minimum compressive strength of 10 MPa.
- 6.84.5.2.2.2 The temperature of the plastic concrete at the time of placement shall meet the requirements for the manufacturing of concrete of subsection 6.33 *Cast-in-Place Concrete*.
- 6.84.5.2.2.3 The concrete shall not be placed against any material whose temperature is above 35°C or below 0°C.
- 6.84.5.2.2.4 The concrete curing shall start immediately after surface finishing but shall not damage the surfaces.
- 6.84.5.2.2.5 The curing of concrete surfaces shall be performed during seven (7) consecutive days at a minimum temperature of 10°C or during the period required for the concrete to reach 70 % of the compressive strength required at twenty-eight (28) days.
- 6.84.5.2.2.6 During the first forty-eight (48) hours of curing or as long as the concrete has not reached a minimum compressive strength of 15 MPa, the Contractor shall take the necessary precautions to eliminate shocks, vibrations and other causes of concrete deterioration.
- 6.84.5.2.2.7 At least one of the following methods shall be used to cure the concrete, alone or in combination with others:
- 6.84.5.2.2.7.1 absorbent fabric: the surface shall be completely covered and the fabric shall be kept continuously damp;
- 6.84.5.2.2.7.2 waterproof sheet: the sheets used shall overlap over 100 mm, be well sealed to each other and completely cover the surfaces;
- 6.84.5.2.2.7.3 membrane-forming curing material: the curing material shall be applied at a rate of 0.2 L/m<sup>2</sup> on all surfaces of the concrete. The curing material shall be well shaken before application in order to obtain a homogeneous film on the entire surface.
- 6.84.5.3 MOLDED-IN-PLACE CURBS
- 6.84.5.3.1 General
- 6.84.5.3.1.1 The Contractor shall perform the molded-in-place curb work in accordance with the indications on the plans.
- 6.84.5.3.1.2 Molded-in-place curbs shall not deviate by more than 6 mm from the alignment and profile indicated on the plans. Any section that presents irregularities exceeding 5 mm within a 3 m surface area shall be redone at the expense of the Contractor.

- 6.84.5.3.2 Concrete
  - 6.84.5.3.2.1 Concrete curing shall start immediately after surface finishing but shall not damage the surface.
  - 6.84.5.3.2.2 The curing of concrete surfaces shall be performed during seven (7) consecutive days at a minimum temperature of 10°C or during the period required for the concrete to reach 70 % of the compressive strength required at twenty-eight (28) days.
  - 6.84.5.3.2.3 At least one of the following methods shall be used to cure the concrete, alone or in combination with others:
    - 6.84.5.3.2.3.1 absorbent fabric: the surface shall be completely covered and the fabric shall be kept continuously damp;
    - 6.84.5.3.2.3.2 waterproof sheet: the sheets used shall overlap over 100 mm, be well sealed to each other and completely cover the surfaces;
    - 6.84.5.3.2.3.3 membrane-forming curing material: the curing material shall be applied at a rate of 0.2 L/m<sup>2</sup> on all surfaces of the concrete. The curing material shall be well shaken before application in order to obtain a homogeneous film on the entire surface.
- 6.84.5.4 CONCRETE PROTECTIVE COVER
  - 6.84.5.4.1 General
    - 6.84.5.4.1.1 The Contractor shall perform the concrete protective cover work in accordance with the indications on the plans.
    - 6.84.5.4.1.2 The cover surface shall be leveled to the profile indicated on the plans and finished with a trowel made of aluminum or magnesium alloy, taking care not to bring the cement paste up to the surface. The finished surface shall be uniform and free of ripples.
  - 6.84.5.4.2 Reinforcing steel
    - 6.84.5.4.2.1 The wire mesh shall be placed at mid-thickness of the cover and shall be fixed at its ends to prevent any movement during placement of the concrete. The Contractor shall use plastic spacers staggered at a maximum distance of 1,200 mm from each other in order to maintain the wire mesh at the required distance from the ground. Each section of wire mesh shall overlap the previous one by 300 mm.

## 6.84.6 QUALITY CONTROL

### 6.84.6.1 CAST-IN-PLACE OR MOLDED-IN-PLACE CURBS AND GORES

#### 6.84.6.1.1 Concrete

6.84.6.1.1.1 Cast-in place or molded-in-place concrete shall meet the quality assurance requirements for concrete structures of subsection 6.33 *Cast-in-Place Concrete*.

#### 6.84.6.1.2 Curing materials – Certificate of conformity

6.84.6.1.2.1 For each delivery of curing material, the Contractor shall provide the Engineer with a certificate of conformity containing the following information for each production batch:

6.84.6.1.2.1.1 class of the product according to standard ASTM C309;

6.84.6.1.2.1.2 production batch number;

6.84.6.1.2.1.3 application rate (L/m<sup>2</sup>);

6.84.6.1.2.1.4 water loss (kg/m<sup>2</sup>) at seventy-two (72) hours.

6.84.6.1.2.2 A production batch corresponds to a specific quantity of curing material with the same physico-chemical characteristics, manufactured according to the same recipe, from the same source of supply and during an uninterrupted period of production.

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**END OF SUBSECTION**