

TECHNICAL SPECIFICATIONS

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1.0 Generality

1.1 SPECIAL QUOTE

The general and specific clauses take precedence over the clauses of the general conditions which they supplement. This special quote refers to the standard quote BNQ 1809-900 BNQ 1809-300 and to the general specifications and specifications (CCDG) of the MTQ (2020). These documents are an integral part of the tender documents and the contractors are required to obtain them.

1.2 MATERIALS

Unless otherwise specified, the Contractor must use new materials only.

1.3 SITE ORGANIZATION

Section 10 "Site organization, site premises, traffic maintenance and signaling and environmental protection" of the CCDG (2020) is an integral part of this document and must be fully followed.

1.4 CLEANING

The Contractor must, daily, clean the work site to the satisfaction of the Project Manager. Before the site is closed, the Contractor must collect and dispose of all debris and waste from the work at an authorized site.

2.0 EXCAVATIONS AND BACKFILL

2.1 FILLING AROUND THE STRUCTURES

The Contractor must backfill around structures such as sumps, manholes, valve boxes, etc., using granular material such as MG-20b. The material must be laid on by layers of approximately 600 mm around the structure per layer of 300 mm maximum compacted to 90% of the modified Proctor, except in the portion corresponding to the foundations of streets or the material used as well as the compaction must meet the requirements of standard foundation and paving cuts.

2.2 SLOPE STABILITY AND EXCAVATION

The contractor must take note of the environmental and geotechnical study for the stability of the excavation slope. The contractor must submit the plans signed and sealed by an engineer of his working method and shoring to achieve the slope stability requirements and the safety code for construction work S-2.1, r.4

3.3 LOSS OF VOLUME MASS AND SOIL REHABILITATION

If the natural soil or a layer of a material, already compacted to the required density,

undergoes, before the end of the work, a density loss due to the circulation of the equipment, to bad weather, to the action of frost- thaw or for any other reason, the Contractor must redo, at its expense, the compaction to the required density.

2.3 CONTAMINATED MATERIAL

During excavation work, if the Client or his representative suspect the presence of contaminated material, The Contractor must temporarily suspend the work and must call the laboratory to carry out the tests necessary to determine the contamination present. The Contractor must dispose of the contaminated equipment in a location authorized by the Engineer on site and must cover the equipment with a waterproof membrane while awaiting the specifications of environmental specialists.

3.0 CITY WATER

3.1 GENERAL

All the prescriptions of the general specification BNQ 1809-300 / 2018 "Construction work – general technical clauses - drinking water and sewer pipe" according to the most recent version, form an integral part of this tender document and must be fully followed with the clarifications in this section.

3.2 PIPES

The water mains must be either of the type:

PVC-U DR-18, diameter indicated on plans, with seat. All these pipes must comply with the specifications of the BNQ 3624-250 and BNQ 1809-300 / 2018 standards for the installation of the latter.

3.2.1 LOCATOR WIRE

In order to allow localization of the pipe, the Contractor must install a # 8 CSA TWU (-40 degrees Celsius), 600 V tracer wire along the axis of the pipe over its entire length. This wire must be fixed to each length of pipe, wound at the valves as well as at the base of the fire hydrants up to the flange of the body of the fire hydrant. All the tracer wire joints must be sealed using a self-adhesive rubber membrane of "3M" or equivalent accepted.

3.3 WATER SUPPLIES AND ACCESSORIES

All fittings, accessories (elbow, reducer, tee, service connection sleeve, etc.) must be of the same material, of the same class, and come from the same supplier as the main pipes.

3.4 VALVE

Valves 150 mm or 200 mm in diameter must be direct flow valves with a resilient seat, in accordance with the requirements of AWWA C550 or AWWA C509 standards, and they must have the characteristics described below:

-
- a) They must be made of cast iron, have a fixed rod in cast bronze, with double cover or in one piece. The disc must be made of cast iron, completely covered with urethane rubber;
 - b) They must be fitted with a 50 mm square prescription cap with indication of opening to the left. They must bear on the hat or the body, cast directly on the coin, the inscription AWWA;
 - c) The stem seals must be of the O-ring type; it must be possible to replace these seals when the valve is fully open and at full operating pressure;
 - d) They must be waterproof and must function easily when subjected to a maximum operating pressure of 1375 kPa;
 - e) The joints must be of the interlocking type (Tyton or equivalent) and have the same diameter as that of the corresponding pipe;
 - f) They must be covered with fused epoxy both inside and outside in accordance with AWWA C550; and
 - g) The bolts and nuts that join the parts of the valve must be made of stainless steel, class 304.

Tapping valves must be Model F-6100 by Clow or Model A-2360 by Mueller or the approved equivalent.

3.5 WATER RECOVERY

Contrary to article 5.16 of BNQ 1809-300 / 2018, when the ground cover above the water pipes as well as above the private aqueduct connections and fire hydrants is less than 1,800 mm, the Contractor must lay approximately 150 mm above the pipe or the connection, a rigid insulation (blue styrofoam HI-40) 2400 mm wide and 50 mm thick, over the entire distance where the covering is less than 1,800 mm. The Contractor must level the granular material to ensure that the insulation does not crack.

3.6 EXISTING VALVE

When closing drinking water, the Contractor must consider that certain existing valves are not watertight and must take this into account when connecting new pipes to existing pipes.

3.7 CATHODIC PROTECTION OF THE VALVES AND THE SET OF FIRE TERMINALS

Valves, waterworks service entrances, and the set of fire hydrant sockets as well as all cast iron parts (elbows, tees, etc.) must be protected against corrosion by complying with the following requirements:

3.7.1 CHARACTERISTICS OF ZINC ANODES

All prepackaged zinc anodes are of the Z-24-48 or Z-12-24 type in accordance with the

following specifications:

The cast zinc alloy complies with ASTM B-418-73 Type II according to the weights and lengths specified below.

<u>Type of anode</u>	<u>Weight of zinc</u>	<u>Length of zinc</u>
Z-24-48	10,9 kg	1220 mm
Z-12-24	5,4 kg	610 mm

The zinc molding is contained in a cardboard tube having the following dimensions:

<u>Anode type</u>	<u>Tube diameter</u>	<u>Tube length</u>
Z-24-48	127 mm	1520 mm
Z-12-24 1	27 mm	760 mm

The zinc molding inside the tube is surrounded by a selected filling, having an electrical resistivity of less than 45 ohm-cm wet, a compacted density of 1.5 g / cm³ and the following composition:

Gypse 77 ± 2% Bentonite 15 ± 1% Sulfate de sodium 8 ± 1%

All prepackaged zinc anodes are supplied with 3000 mm copper cable # 10/7, with orange TWH insulation.

3.7.2 TYPE

The type of anode to be installed on the various equipment must meet the following requirements:

- a) Installation of a prepackaged zinc anode of the Z-12-24 type, on each valve, with a nominal diameter up to 300 mm, as well as on each water service inlet.
- b) Installation of a prepackaged zinc anode of type Z-24-48, on each set of fire hydrant sockets including its valve when the pipe connecting the terminal to the valve is made of cast iron.
- c) When the pipe connecting the fire hydrant to the valve is made of PVC-U, an anode must be installed on each valve according to the requirements described in point a) of this article and for the fire hydrant, it is necessary to install the type of anode Z-24-48 described in point b) of this article.

3.7.3 INSTALLATION PROCEDURE

For the installation of the anodes, the Contractor must respect the following procedure:

Place the anodes at the same depth as the pipe, parallel to the pipe and at a minimum distance of 300 mm from the pipe.

Do not handle the anodes by their cable.

Wind and tie the cable from the anode to the fitting to avoid any tension, either on the anode or on the connection to the fitting during backfilling and subsequent soil compaction.

Connect the anodes to the fire hydrant assemblies and to the valves by the aluminothermic welding technique using the products manufactured by Erico Product (# CAB-133-M). Mechanical assembly (with a bolt) will not be allowed.

Make all joints electrically continuous on ductile iron pipes, valves and fire hydrants, either using a key or copper strip specially designed to make the electrical connection.

Clean and file an area of 50 mm x 50 mm on the surface of the pipe, until the white metal is exposed.

Strip the end of the anode cable from its insulation, attach it to the metal surface prepared using the thermite welding technique. (N.B. Use Cadweld mold no CAHBA-1G, CA25 XF-19 cartridge and CAB-133-1L socket for the cable).

Prepare the end of the cable to be soldered as follows:

Strip the cable to expose a length of 3.5 cm of copper conductor.
Make sure the copper conductor is clean and dry.
Crimp the CAB-133-1L socket on the copper conductor.

Prepare the welding mold as follows:

Scrape the crucible to remove any clinker deposits.
Insert the tin disk in the bottom of the crucible.
Pour the contents of a cartridge into the crucible and make sure that there is no ignition powder left from the bottom of the cartridge.

Solder the cable as follows:

Place the soldering mold on the prepared surface and insert the cable underneath.
Close the lid and ignite the charge using a gun with a flint.
Remove the soldering mold when the solder is a dull red color.

After cooling, blow up the bottom clinker with the side of the file, check the weld by hitting it with a hammer and redo the weld if necessary.

If the weld is to be redone, a new weld must be made no closer than 15 cm from the original.

Seal the completed connection against moisture penetration using a good application of "Tapecoat" or "Primer" # 937 sealant.

3.8 DIVERSION OF AQUEDUC

The Contractor must carry out a water diversion in order to allow the bypassing of planned or existing obstacles. The Contractor must provide the necessary transition pieces in order to

connect to the existing pipe, the material of which is probably different from that of the planned pipe. The Contractor must provide retaining joints on all the parts of the piping necessary for the realization of the water diversion. The retaining joints will be of the UNI-FLANGE 1360 or 1390 series with cathodic protection.

3.9 CERTIFICATION AND COMPETENCE OF LABOR

The Regulation on the quality of drinking water (art. 44) requires that, for municipal systems with residential customers, the operation and monitoring of the operation of the following facilities be carried out by a recognized competent person (ex OPA certification):

the installation of water catchment (underground or surface); the treatment facility; the distribution installation (including booster and re-chlorination stations); the tanker delivering water intended for human consumption.

In the case of non-municipal systems and municipal systems with an exclusively tourist or institutional clientele, the operation and monitoring of the operation of these same facilities must either be carried out by a recognized competent person, or carried out under the supervision of a recognized person competent.

The Regulation also requires that for municipal systems and for non-municipal systems, certain tasks be performed or supervised immediately by a person recognized as competent. These tasks are:

maintenance or repair of a drinking water distribution pipe; maintenance or repair of equipment attached to a drinking water distribution pipe (fire hydrant, valve, air vent, etc.); the commissioning of a pipe following repair or extension work.

Work performed in connection with the installation and maintenance of a temporary pipe is subject to the same requirements as work carried out on a permanent pipe.

The regulation considers competent all persons holding a diploma, a certificate or a recognized attestation as specified see on the MELCC website <http://www.MELCC.gouv.qc.ca/eau/potable/brochure/>

The contractor must ensure that the personnel operating or supervising interventions on the drinking water network have all the qualifications required by the regulations.

4.0 SEWER

4.1 GENERAL

All the prescriptions of the general specification BNQ 1809-300 / 2018 "Construction work - general technical clauses - drinking water and sewer pipe" according to the most recent version, form an integral part of this tender document and must be fully followed with the clarifications in this section.

4.2 SPILL OF WASTEWATER INTO THE ENVIRONMENT

No discharge of wastewater into the environment is permitted during the performance of the work. The Contractor must take all possible measures to prevent a spill.

4.3 DOMESTIC SEWER PIPES

Domestic sewer pipes must be made of the same material, in accordance with the following specifications:

Domestic sewer lines must be made of unplasticized poly (vinyl chloride) (PVC-U) class DR 35 with seat and coating, in accordance with BNQ 3624-130 standards.

4.4 RAIN SEWER PIPES

All storm sewer pipes are of the diameter indicated on the plans and must be made of the same material, in accordance with the following specifications:

The domestic sewer pipes must be made of high-density polyethylene (HDPE) with seat and coating, in accordance with BNQ 3624-120 standards.

4.5 TEX-O-FLEX MEMBRANE

All manholes (existing and proposed), new sumps (existing and proposed) and valve boxes (existing and proposed) must be surrounded by a "TEX-O-FLEX 40-12" type membrane as manufactured by the company Solmax Texel. The installation method of this membrane must, in all respects, comply with the manufacturer's recommendations, but the following points must be more specifically respected:

The overlap must be at least 300 mm and the membrane must be attached using belts resistant to degradation.

A granular material of the MG-20b type must be placed all around the manhole over a minimum radius of 600 mm, except for the upper part of the manhole which must respect the required street structure cut. Densification of the granular material to 90% of the modified Proctor, per 300 mm layer, must be carried out.

4.6 MANHOLE

The Contractor must take note that he must fill in the space between the pipe and the prefabricated sump of all new manholes required in this project. All these manholes are made of reinforced concrete, of the prefabricated type, with rubber lining, ladder, frame and cover. Inlets and outlets are fitted with a suitable monolithic rubber seal. The manholes must comply with the requirements of standard BNQ 1809-300.

For all manholes over 3 meters in height, the Contractor must provide a galvanized steel security grid with a chain and an anchoring eyelet in the manhole head, all supplied by the company Lécuyer or the equivalent approved. In such a case, the frame must be provided with a shoulder to receive this grid. The manhole over 6.0 m must have a galvanized steel safety bearing.

When required, the Contractor must supply and install a chute and a landing in the manholes, as required by the Project Manager.

4.7 FRAMES AND LIDS OF MANHOLE, MANHOLE AND KEY MOUTH

The frames and covers required for this project have the following requirements:

- A guiding frame;
- A shoulder at the base of the frame to receive the security grid, when required;
- The frame and the cover of manholes, sumps as well as the mouths of key are of adjustable type of the company Fonderie Laperle or the approved equivalent, of the models described below:

Item	Type
Manhole frame and covers (installation in paving)	Adjustable made of ductile iron, Laperle C 50 M or Mueller Foundry.
Manhole guide frame (installation in paving)	In gray cast iron, adjustable, Fonderie Laperle CG 30.5 or Mueller
Mouth to key	VB-2000 with extension, adjustable and anti-plow.
Sump frame and grid (installation in paving)	In ductile iron, adjustable, Foundry Laperle C 50 P or Mueller. (P-3V grid)
Sump guide frame (installation in paving)	In gray cast iron, adjustable, Fonderie Laperle CG 29.5 or Mueller.
Manhole or sump frame and cover (installation without paving)	In gray cast iron. Laperle C-6S Mueller Foundry. (P-3V grid for sump)

The parts for the frames and buffers must be cast or / and machined so that they fit perfectly into each other. Runways, roughness, burrs and other projections must be removed and any surface must be reasonably even and soft. They must comply with the dimensions indicated on the drawings and sketches provided. Runways, roughness, burrs and other projections must be removed and all surfaces must be reasonably even and smooth.

L'ensemble cadre et tampon pour les regards d'égout et les chambres de vannes doit présenter une ouverture libre minimum de 771 mm de diamètre lorsqu'il y a un appui pour une grille de sécurité et de 710 mm dans les autres cas.

The stamps must bear the manufacturer's identification in addition to the lettering requested by the city or the owner where the work is carried out.

4.8 PREFABRICATED CATCH BASSIN

The catch bassin must be built in compliance with the requirements of the "GENERAL TECHNICAL CLAUSES" and the following criteria:

Manholes in the street right-of-way

The diameter of the connection pipes is 200 mm in diameter in PVC-U DR-35 with seat.

The connection to the main pipe must be made with a KOR-N-TEE connector.

The catch bassin must have two (2) openings 100 mm in diameter and a drain 5 m long.

SOLFOMAX type perforated 320 Kpa with geotextile to drain the street or parking foundation, the openings must be made at the height of the infrastructure. manholes sections must be assembled using butyl trim.

A concrete slab 1200 mm in diameter and 200 mm thick should be used. The catch basin must be made by Lécuyer type P-4 or the approved equivalent.

4.9 HDPE CATCH BASSIN

The catch bassins must be built in compliance with the requirements of the "GENERAL TECHNICAL CLAUSES" and the following criteria:

When specified on the plan, the contractor must provide for the supply and installation of HDPE catch bassins. The pipe used to manufacture the manhole will be certified to standard NQ 3624-120 as manufactured by Soléno. The catch basin will be made of a polyethylene resin conforming to the classification by properties PE 334420C, as defined according to standard ASTM D3350. The diameter of the connection pipes is 200 mm in diameter in PVC-U DR-35 with seat. The catch basin must have two (2) openings 100 mm in diameter and a drain 5 m long. SOLFOMAX type perforated 320 Kpa with geotextile to drain the street or parking foundation, the openings must be made at the height of the infrastructure. The catch basin sections must be assembled according to the manufacturer's requirements. The frames, grids or covers will be made of cast iron of the S series.

The catch bassins under the floor must be triple-walled with a smooth exterior as produced by Soleno.

4.10 PROTECTION OF THE WATERMAIN

The Contractor must install rigid insulation to protect the water pipe when the catch basin or manholes are installed at a distance of less than 1000 mm from the aqueduct pipe. The costs of rigid insulation are payable on the slip.

5.0 FOUNDATION AND PAVING

5.1 GENERAL CONDITION

The requirements contained in these clauses apply to all foundation and paving work. The Contractor is required to comply with them as well as with all those of the specific technical clauses and other documents which form an integral part of the contract.

5.2 SCOPE OF WORK

Foundation and paving work include the labor, materials, machinery and tools necessary for the execution of foundation and paving work. They also include the transport and supply of any necessary material as well as the cleaning of the premises, the removal of unusable materials, the installation of crushed stone, the preparation of the surface and the seal coating, as well as all other work necessary for the proper execution of the work in accordance with the plans and specifications.

5.3 AGGREGATES AND ASPHALT

The granular materials and the bituminous concrete used for the pavement structure must meet the requirements of the CCDG of the MTQ, the most recent edition for this type of use. The aggregates will be new.

5.4 FOUNDATION

5.4.1 PUTTING IN PLACE AND COMPACTION OF THE FOUNDATION

The materials will be leveled to obtain the profile shown on the plans.

The Contractor must ensure that the materials do not undergo segregation and, if necessary, must scarify and moisten them in order to meet the requirements of compaction.

The foundation will be compacted with the appropriate equipment so as to obtain a compactness of at least 95% of the Modified Proctor.

The finished surface must be uniform, free from depression and conform to the determined profile and crown. All places unreachable to the roller must be mechanically pounded in order to obtain a compaction equal to that of the rest of the foundation.

The finished surface must not have any depression greater than 10 mm within 2 m of the prescribed profile.

The Contractor must take into account the weather conditions so that no foundations are left under bad weather. According to the above, unstable or saturated surfaces must be repaired at the Contractor's expense.

5.4.2 CONSTITUENT LAYER

The constituent layers of the street foundations (sub-foundation or geotextile, lower foundation and upper foundation) are as shown on the plans.

5.4.3 FOUNDATION TRANSITION

When connecting to the existing pavement, the Contractor must make a transition in materials as illustrated in the standard drawing DN-II-1-021 from the MTQ.

5.4.4 MAINTENANCE AND DECONTAMINATION

The Contractor must keep the street suitable for vehicles, according to the specifications of the Contracting Authority.

The Contractor must also prepare and shape the upper foundation for the reception of the paving layer.

5.4.5 CRUSHED STONE

The crushed stone must meet the criteria of BNQ 2560-114 in its most recent update and with the related sections relating to the registered standard.

5.4.6 ACCEPTANCE OF THE LOT

The acceptance check is carried out after the complete implementation of the layer or batch. Sampling and testing has to be carried out by the supervisor or his representatives.

The judgment on the conformity of the granulometry of the foundation materials is based on the batch evaluation. Each lot represents an area of approximately 7,500 m² unless otherwise indicated in the plans and specifications (e.g. three (3) samples per street); it always consists of three (3) samples located randomly and representing three (3) equal sections. At the end of a contract, any area less than 1500 m² is incorporated into the previous lot. The lot limits are determined by the supervisor before the start of work and this information is communicated to the Contractor.

A non complying lot is when the average of the three (3) particle size results fully meets the requirements stipulated for the 5 mm and 0.080 mm sieves and the measured compactness meets the requirements.

5.4.7 REJECTION OF A LOT

A batch is rejected when the difference between the average of the three (3) grain size results and the values set by the M.T.Q. for the percentage passing through the sieve of the aggregates exceeding at least one of the critical deviations (EC), defined below:

Ec (For spec. below the 5 mm sieve)	:	-5%
Ec (For spec. over the 5 mm sieve)	:	+5%
Ec (For spec. over the 0.080 mm sieve)	:	+1%

In this case, the Contractor removes and replaces, at his expense, the aggregates included in the rejected lot.

5.4.8 REVISED PRICE DURING NON-CONFORMITY

The unit price, per square meter, includes the manufacturing, supply of all materials, drilling, blasting, crushing, storage, correction of particle size, loading, weighing, processing, compaction and any incidental expenses. Transport is also included in full in the unit price, unless it is the subject of specific articles on the slip.

If the average of the three (3) particle size results of a batch or six (6) results exceeds the requirements stipulated for 5 mm and 0.080 mm sieves while being less than or equal to critical deviations defined for these sieves, the Contractor removes and replaces, at his own expense, the crushed aggregates included in this lot or accepts that the unit price be revised according to the following formula:

$$PR=(1-(F_{c.80}+F_{c.5})) \times PU$$

PR :	revised unit price
F _{c80} :	correction factor for the characteristic "passing 0.080 mm"
F _{c5} :	correction factor for the characteristic "passing 5 mm"
PU :	unit price on the slip
X :	batch average (% passing)

$$F_{c80}=40(x-7)/100$$

According to the batch average for the percentage passing the 5 mm is greater than 60 or less than 35, the correction factor F_{c5} is calculated according to one of the following formulas: (the numbers 60 and 35 may change depending on the size of the aggregates)

$$F_{c5}=8(x-60)/100$$

$$F_{c5}=8(35-x)/100$$

The retention for a non-conforming crushed aggregate is obtained by multiplying (PU + PR) by the targeted quantities.

5.4.9 CONTRACTOR'S RECOURSE

When a batch does not comply with the requirements for acceptance of a batch and the Contractor wants to exercise his right of recourse, he must use the control samples which he has already had taken at the same time as those of the materials control laboratory. If such samples have not been taken, it must hire an independent laboratory to randomly take new samples and seal them. The new tests must be carried out by a laboratory member in good standing of the A.C.L.E. The taking of new samples as well as the performance of particle size tests must be carried out during working hours and days. The cost of additional withdrawals is at the expense of the Contractor.

The determination of the location of the samples, the samples and the tests must be carried out in the presence of a representative of the laboratory mandated by the client. Any comments regarding methods deemed to be incorrect must be notified immediately, and any diverging opinion must be notified in writing to the Promoter by the Contractor within seven (7) working days of the date of receipt of the original results from the laboratory, otherwise the Contractor waives his right of recourse.

The total number of withdrawals from a batch is six (6). They are used for the final calculation of the batch average. Compliance is again assessed by the supervisor and the revised price is established, if applicable.

The cost of the particle size tests is at the expense of the Contractor when the average value calculated from the new batch results does not fully meet the requirements. If, on the contrary, the new results are consistent, the costs of the particle size tests are then shared equally with the Promoter.

The Contractor who installs the asphalt or any other material before receiving the particle size results from the foundation waives his right of recourse, unless the samples were taken before recovery, according to the procedure defined in this article.

The Contractor must present their new results within seven (7) days after taking the samples, otherwise, the City considers that the Contractor waives its right of recourse. The latter must, however, reimburse the Contracting Authority for the costs which he has incurred.

5.4.10 CHANGES OF ALIGNMENTS OR PROFILES

The Engineer reserves the right to make changes to the alignments or on the profiles shown on the plans. When the Contractor is notified of such a change, he must comply with it without delaying the work.

5.4.11 INFRASTRUCTURE STABILITY

The Tenderer must tender with the express agreement that he must take all the necessary precautions in the preparation of the infrastructure so that his paving is permanently supported and he will not be relieved of the responsibility imposed on him by this clause because " soil of lower quality or that trenches and tunnels would have been made prior to the date of receipt of tenders at or near the paving to be built.

5.5 PAVING

5.5.1 TERMS AND CONDITIONS

The requirements contained in these clauses apply to any foundation correction and paving work. The Contractor is required to comply with them as well as with all those of the specific technical clauses and other documents which form an integral part of the contract.

5.5.2 GENERAL SPECIFICATIONS AND SPECIFICATIONS (CCDG)

The various types of asphalt mix installed must meet the requirements of section 14 of the CCDG. 2020. Only the articles mentioned below take precedence over the CCDG of the MTQ.

5.5.3 ADJUSTING PUBLIC SERVICE PARTS

Before proceeding with the paving works, according to what is written on the slip, the Contractor must adjust or replace the services such as manhole frames, catch bassin or valve box, in order to meet the profiles shown on plans.

Unless otherwise indicated, the adjustment must be made with materials of the same shape, size and quality as those which constitute the existing structures. No degradable brick or part can be used for this work.

In the absence of adjustable frames and covers, the services must be adjusted to 12 mm lower than the final level of the paving.

The Contractor must provide that adjustments can be made up to a height of 50 mm higher than the existing level, but that damaged parts may have to be replaced up to a depth of 350 mm. These parts will be paid individually. In addition, final adjustments must be made with concrete rings of 100 mm for manholes and 150 mm for sumps. For any lesser thickness adjustment and in the absence of an adjustable structure, rubber rings, as specified in BNQ 1809-300 / 2018, must be used.

Slope adjustments must be made using two (2) variable rings placed in the appropriate axis.

Mortar and shims will not be accepted. If more than one ring is used, the Contractor will join them together using four (4) galvanized screws.

For sanitary manholes, tight seals (butyl) must be installed between each element or section.

Before proceeding with the laying of the paving, the Contractor must thoroughly clean the surface and brush with a bonding binder the surfaces in contact with the paving, ie the borders, manholes, etc.

The unit price on the schedule includes the excavation around the services, the stone filling, the supply of all the materials, the transport, their implementation, the painting and any incidental expenditure.

5.5.4 REPLACEMENT OF MANHOLE SECTION

When a manhole or catch bassin section needs to be replaced, the Contractor must remove the manhole and catch bassin head to replace the said section.

The replacement must be made with materials of the same shape, size and quality as those which constitute the existing structures. Concrete sections thus replaced must be manufactured by Lécuyer or equivalent approved upon submission.

The Contractor shall provide for the removal and disposal of the section, the excavation, the backfilling, the supply of all materials, transportation, implementation and all other incidental expenses.

If the removed section is judged to be in good condition by the Engineer, it must be delivered to the place that the Contracting Authority will indicate to the Contractor.

5.5.5 VALVE BOX REPLACEMENT

When required and requested by the Engineer, the Contractor must replace the top section of the valve box with a new valve box.

The replacement must be made with materials of the same shape, size and quality as those which constitute the existing structures but must be adjustable (variable height by sliding). The replaced sections must be manufactured by Mueller or Fonderie Laperle.

The Contractor shall provide for the removal and disposal of the damaged section, excavation, backfilling, supply of all materials, transportation, implementation and other incidental expenses.

If the removed section is judged to be in good condition by the Engineer, it must be delivered to the place that the Contracting Authority will indicate to the Contractor.

5.5.6 REPLACEMENT OF FRAMEWORK

When indicated in the plans and specifications or at the request of the Engineer, the Contractor must replace the manhole frames which are damaged and replace them with an adjustable structure as manufactured by Mueller or Fonderie Laperle.

The manhole frame will be made of ductile iron and must meet the requirements of standard BNQ 1809-300-2004.

If the removed section is judged to be in good condition by the Engineer, it must be delivered to the place that the Contracting Authority will indicate to the Contractor.

5.5.7 REPLACEMENT OF THE CATCH BASSIN'S HEAD

When indicated in the plans and specifications or at the request of the Engineer, the Contractor must replace the catch bassin's heads which are damaged by an adjustable structure as manufactured by Mueller or Fonderie Laperle.

The replacement must be made with materials of the same shape, size and quality as those which constitute the existing structures but the structure must be able to be adjusted by sliding. The replaced concrete sections must be manufactured by Lécuyer or an approved equivalent.

If the removed section is judged to be in good condition by the Engineer, it must be delivered to the place that the Contracting Authority will indicate to the Contractor.

5.5.8 ADJUSTMENT OF SHOULDERS

When the street has no curbs, the Contractor must adjust the shoulders.

The Contractor must use crushed stone of caliber MG-20b in accordance with the requirements of these specifications.

The shoulders must be compacted to at least 95% of the Modified Proctor. The final shoulder elevation must not be higher than the paving and must drain towards the land adjacent to the street.

5.5.9 ELEVATIONS AND LOCATIONS

All construction must be done according to the levels and alignments planned and accepted by the Engineer. All work not complying must be demolished and replaced by the Contractor, at his expense and expense, and to the satisfaction of the client.

5.5.10 CHANGE TO ALIGNMENTS OR PROFILES

The Engineer reserves the right to make changes to the alignments or to the profiles shown on the plans. When the Contractor is notified of such a change, he must comply with it without delaying the work.

5.5.11 CONNECTION WITH EXISTING PAVING

In places where it is necessary to connect to existing paving or where a certain part must be repaired or widened, unless otherwise indicated, the costs of these works are included in the contract and include the following works:

- sawing the existing paving as well as removing and transporting it off site;
- scarification of the existing stone to a minimum depth of 100 mm from the existing surface to allow uniform compaction;
- compaction of the foundation to 95% of the modified Proctor;
- supply and installation of priming bitumen;
- supply, placement and compaction of bituminous concrete; and
- all other work necessary for the implementation of these works.

The Contractor is responsible for the sawn edges of paving and any crumbling, breakage or other, must be resawed in a straight line. Work in this excess area to be repaired is at the Contractor's expense.

5.5.12 BITUMINOUS COATING

The Contractor must use the type of coating specified in this document. If during the performance of the contract, the Engineer deems it necessary to use a bituminous coating other than the type specified in the tender, the Contractor will be paid in addition to or less than the price entered in the schedule for the bituminous coating.

When a binder layer is used, it must be covered by the wearing surface within twenty-four (24) hours following the installation of the binder layer unless otherwise instructed by the Engineer.

The bituminous concrete used must have the composition and have the other characteristics specified in the estimate. It is the same for all the materials used in its manufacture.

5.5.13 MIXTURE FORMULA

These mixtures are prepared in a central coating station. They consist of coarse aggregates and fine aggregates or only fine aggregates, uniformly coated with a bituminous binder heated to the specified temperatures.

5.5.14 ACCEPTANCE OF THE CONSTITUENTS OF BITUMINOUS MIXTURES

For verification and acceptance, the Contractor must submit to the Contracting Authority's laboratory, one (1) week before the start of work, representative samples as a basis of comparison to judge the uniformity of production.

5.5.15 ACCEPTANCE OF BITUMINOUS MIXTURE FORMULAS

For verification and acceptance, the Contractor must submit to the Contracting Authority, at least one (1) week before the start of work, the bituminous mix formulas which will be used.

The Contractor must provide the following information for each type of mixture:

- a) the provenance, particle size, intrinsic and manufacturing tests as well as the percentage or proportion by weight or by volume of the cold aggregates and the granularity of the combined;
- b) the percentage of absorption of the combined cold aggregate;
- c) the granularity of the bituminous mixture;
- d) the proposed bitumen content, the compatibility of the mixture as well as the average thickness of the film of effective bitumen at the proposed bitumen content; and
- e) the curves of the physical characteristics of the mixture at five (5) points for each of the following features:
 - stability
 - the creep index
 - unit mass
 - the percentage of vacuum in the mixture
 - the percentage of void between the aggregates

An initial verification is made by a test laboratory to ensure that the data of the mixing formula conform to the standards indicated.

Subsequently, the laboratory verifies, by means of laboratory tests, the data supplied by the Contractor. This verification is accompanied by the analysis of the first four (4) samples of the mixture produced.

Following this verification, the Contracting Authority advises the Contractor of its decision.

5.5.16 SITE APPROVAL

From the start of the Contractor's operations, the Engineer verifies, by analyzing a first batch of samples, whether the admissible deviations in the mixture from the formula submitted are in conformity.

The Engineer also checks the compaction, texture and appearance of the coating. If necessary, the necessary corrections are made to the proposed formula.

5.5.17 FINAL APPROVAL

The final mixing formula approval is made after the overall analysis of the test results, at the end of the asphalt work or at the time of the cessation of the production of this mixing formula.

5.5.18 NEW FORMULA

Any new formula cannot be used until it has been checked by the laboratory. When a source of aggregate is changed, a new formula is required.

5.5.19 BITUMINOUS MIXTURES MATERIALS

5.5.20 SPECIFICATIONS AND GENERAL SPECIFICATIONS (M.T.Q.)

The various types of asphalt mix installed must meet the requirements of the CCDG 2020 and the most recent addenda. Only the articles mentioned below take precedence over the CCDG of the MTQ.

5.5.21 AGGREGATES

The aggregates inside the proposed mixing formulas must meet the following requirements:

Large aggregate: category 3c of standard 2101 (individual result)

Fine aggregate: category 2 of standard 2101 (individual result)

5.5.22 BITUMENS

The bitumen must comply with CCDG 2020 and meet the specifications of MTQ standard 4101.

5.5.23 BASE LAYER

The base layer must meet the requirements listed on the plans and must be 100% fragmented. In addition, the base coat must be laid according to the dates on the slip.

5.5.24 SURFACE LAYER

The surface layer must comply with the requirements listed on the plans and must be 100% fragmented. In addition, the surface layer must be laid according to the dates indicated on the slip.

At all times, a bonding binder must be applied uniformly to the surface (l / m^2) according to the type of surface as described at the CCDG before the installation of the surface layer.

At all times, the Contracting Authority reserves the right to sample bitumen at the factory. The results obtained will prevail over those of the Contractor. On each production day, the Contractor must provide a certificate of bitumen compliance.

5.5.25 CHECKING THE QUALITY OF THE MIXTURE, THE THICKNESS AND THE COMPACTION

The quality of the mixture put in place is verified by random sampling with 300 metric tonnes of asphalt for a total of 1,500 metric tonnes per batch, or five (5) samples.

The verification of the compactness and thickness is carried out by the sampling of carrots, at a random rate, on the area covered by 1000 m² of bituminous mix.

5.5.26 ACCEPTANCE AND REJECTION OF A PRIZE

A batch is accepted when the difference between the average of the batch results and the mixing formula is less than or equal to the tolerable difference for each of the characteristics passing 0.080 mm, bitumen and compactness. The unit price is however revised.

A batch is rejected when the difference between the average of the batch results and the mixing formula is greater than the critical difference for one of the characteristics passing 0.080 mm, bitumen or compactness. In this case, the Contractor removes and replaces, at his expense, the paving included in the rejected lot.

5.5.27 THICKNESS AND COMPACTITY

The thickness and degree of compaction must be determined on each sample. The average thickness and the average of the degrees of compaction must be calculated per street.

For the calculation of the average thickness of the bituminous concrete covering, the samples having more than 10 mm than the required thickness are considered to have only 10 mm more than the required thickness.

When the average thickness of the bituminous concrete coating is greater than the specified thickness or if the average thickness is less than the required thickness of 5 mm or less, the bituminous coating is accepted and paid at the unit price of the contract.

When the average thickness of the bituminous coating is less than more than 15 mm from the specified thickness, the batch is refused and work must be resumed on the extent of the batch.

When the average thickness of the bituminous concrete covering is less than the thickness by more than 5 mm, but less than 15 mm, the unit price is revised.

When the compactness of a batch is less than 93.0% minus the critical deviation, i.e. below 89.0%, the batch is refused. The work must be resumed on the extent of this lot including all the required work, even if the non-conformity in base coat is disputed.

The unit price of the lot is adjusted using the formula presented when the average compactness value is less than 93.0% minus the tolerable difference.

REVISED PRICE DURING NON-CONFORMITY

Tolerable deviations (E _t) from the formula for the main characteristics as a function of the types of mix and the number (N) of samples constituting the batch						
ENROBÉ						
Main characteristic	Type of asphalt	E _t pour N=5	E _t pour N=4	E _t pour N=3	E _t pour N=2	E _t
Passing 5 mm	EB-20	4,8	5,4	6,2	7,6	10,0
	EB-14	3,7	4,1	4,8	5,8	8,0
	EB-10S, EB-10C et CH-10	3,3	3,7	4,3	5,2	7,0
Passing 80 µm	all coated	0,8	0,9	1,0	1,2	1,7
Particle size total	EB-20 et EB-14	19	21	24	30	40
	EB-10S, EB-10C et CH-10	14	16	18	22	30
Bitumen	all coated	0,24	0,27	0,31	0,38	0,50
COMPACTITÉ DU REVÊTEMENT						
Compactness of the coating	Type of asphalt	N=6	N=4	N=3	N=2	E _c
	EB-20	0,8	1,1	1,2	1,4	4,0
	EB-14, EB-10S	1,0	1,3	1,4	1,6	4,0
	EB-10C et CH-10					

Note 1: For compactness, tolerable and critical deviations are applied to the minimum requirement of 93%.

Note 2: Tolerable and critical deviations apply to the average value of the lot compared to the mixture formula.

Note 3: The value of the deviations indicated is expressed as a percentage.

Calculation of the revised unit price of a lot:

The calculation of the revised price for the mixture will be calculated separately for the mixture as well as for the compactness and thickness. However, the overall unit price will take account of the two revised prices and will have to be calculated on the part of the work or the revised unit price will apply.

$$PR_f = PU (1-F_{80} + F_b) \times (E_m/E_s) \times (1-F_c)$$

Thickness and compactness:

$$PR_{ec} = PU (E_m/E_s) \times (1-F_c)$$

Mixed :

$$PR_m = PU \times (1-F_{80} + F_b)$$

If the sum (F₈₀ + F_b) or F_c is greater than 1, this value is reduced to 1.

PR_f = final revised price for mix, thickness and compactness

PR_m = revised price for mixture

PR_{ec} = revised price for thickness and compactness

PU : the unit price includes: the basic price of the mixture, the cost of bitumen and the cost of operations (installation, transport of bitumen and mixture).

F₈₀ : correction factor for the characteristic "passing 0.080 mm".

Fb : correction factor for the "bitumen" characteristic.

Fc : correction factor for the characteristic "compactness".

The correction factor Fc is calculated according to the following formula:

$$0,125 (93-D)$$

D : average compactness of the batch

93 : minimum compactness required

The correction factors F80 and Fb are calculated according to the following formula:

$$\frac{0,50 \times E_f/m - E_t}{E_c - E_t}$$

Ef/m : difference in value between the formula and the lot average

Et : tolerable deviation

Ec : critical deviation

Em : average batch thickness

Es : Thickness specified in tender documents

5.5.28 CONTRACTOR'S RECOURS

When the Contractor is assigned a revision of the unit price for the bituminous mixture, he is entitled to exercise a right of recourse in order to reassess the penalizable characteristic or characteristics are: passing 0.080 mm, percentage of bitumen, compactness and thickness.

Re-evaluation of the characteristics of the mixture (passing 0.080 mm and percentage of bitumen):

The Contractor may request the Engineer the right to exercise his right of appeal within fifteen (15) days of receipt by the Contractor of the results of the analyzes.

These analyzes are carried out on the so-called "witness" boxes taken by the laboratory mandated by the City during the construction site.

The resumption of analyzes on one or more samples is carried out by a laboratory appointed by the Contractor provided that the latter is not the one who carried out the control tests for the coating plant during the production of the mixture deemed deficient.

The cost of the recovery is the responsibility of the Contractor unless the average value calculated from previous results and those of the right of appeal indicates that the lot is in conformity.

The Owner reserves the right to send a representative of his authorized laboratory when exercising the Contractor's right of recourse. Any comment on an operation deemed defective must be notified immediately and any case of discrepancy is brought to the attention of the owner.

Re-evaluation of thickness and compactness characteristics

The Contractor may have additional samples taken, at his expense, in accordance with the following conditions:

The Contractor may take a carot for each sample taken by the Engineer but within a radius of three (3) meters from it, in the presence of a representative of the Contracting Authority. The thickness and compaction measurements must then be made by a testing laboratory recognized and approved by the Contracting Authority.

The methods of these measurements used in the case of the Contractor's samples must be the same as those used by the Client.

The laboratories which will carry out the tests for the Contractor must communicate the results of these tests to the Contracting Authority as well as a report indicating the exact date and location from which each of the samples analyzed was taken.

The result of the cores taken by the Contractor must be combined with the result of the corresponding cores taken by the Client for the calculation of the average thickness and compactness, for each of the lots.

The holes dug in the paving must be filled immediately after sampling by the Contractor, at his expense, with a material of the same kind as that which was used to make the paving.

The laboratories which will carry out the tests for the Contractor must communicate the results of these tests to the contracting authority as well as a report indicating the exact date and location where each of the samples analyzed was taken.

5.5.29 ELIGIBLE GAPS

The admissible deviations in the mixture compared to the established formula must meet the requirements of standard 4201 of volume VII of the MTQ.

5.5.30 BITUMINOUS CONCRETE FOR CORRECTION

The mixture for this bituminous concrete must be EB-10C PG 58-28. This bituminous concrete must be placed over the existing bituminous surface in places where it is lower than the established levels.

5.6 LAYING OF BITUMINOUS CONCRETE

Installation of bituminous concrete, transport, etc. must be carried out in accordance with the CCDG 2020.

5.7 SPREADING OF BITUMINOUS CONCRETE

If the layer of bituminous concrete cracks abnormally during spreading or during rolling, the work must be suspended and the necessary corrections made.

It is forbidden to spread by hand or sprinkle the bituminous concrete at the back of the spreader to correct these anomalies.

Avoid vibrating, trampling or treading the bituminous mixture before rolling, and all the parts thus treated must be raked right through, and you must add a little mixture to start the compaction again using of a roll.

The spreader should be adjusted to spread a uniform layer, the thickness of which should be as close as possible to that specified.

rollers

The rollers must make it possible to obtain compactness and conforming surface characteristics. The following types are accepted:

a) Rollers with steel cylinder

The rollers with steel cylinders can be of the following three (3) types:

three (3) wheel rollers weighing from 9,000 kg to 10,900 kg;
two (2) cylinder tandems weighing from 7,250 kg to 10,900 kg; or
three (3) cylinder tandems weighing from 10,900 kg to 16,300 kg.

b) Tire rollers

These rollers have scrapers and pads to keep the cylinders clean and moist and prevent the mixture from sticking to them. They are perfectly cylindrical, free of flat parts, sunken or having relief, likely to mark the coating. They must exert a sufficient longitudinal linear pressure.

5.8 MANUAL SPREADING

In places inaccessible to the mechanical finisher, the mixture is spread manually. The mixture is evenly distributed and spread out in a loose layer of uniform density using rakes or hoes, taking care to avoid segregation. Before rolling, the Contractor must check the surface with a ruler and correct any unevenness.

5.9 ACCEPTANCE OF THE SURFACE TO BE COVERED

Before the engineer accepts the laying of bituminous concrete layers, the surface to be covered must meet the following standards:

a) The surface to be covered must have a slope and a layout in accordance with the plans. It must be dry, well compacted and free from foreign or non-adherent materials.

b) When the base is rough and / or irregular, the Contractor must use a correction layer placed with a motor grader or spreader and compacted at least twelve (12) hours before he lays the layers subsequent.

c) When a correction layer is not necessary, the depressions and irregularities are corrected to the satisfaction of the Engineer. The Contractor must remove excessively rich or defective parts, beads and surpluses accumulated in cracks, joints or elsewhere.

5.10 CLIMATE CONDITIONS AND TRAFFIC

The preparation and installation of bituminous mixtures must be done under favorable climatic conditions. It is not allowed to operate when the humidity of the aggregates affects the temperature of the mixture and the rate of operations or when the surface to be covered is soggy, covered with puddles of water or mud.

The temperature of the surface to be covered must be greater than 5 ° C and the ambient temperature must allow coatings or treatments to comply with the requirements.

During operations and during the hardening or drying of a plaster or binder and when traffic must be maintained on the treated surface, the speed of the vehicles must not exceed 25 km / h until hardening or adequate drying of the plaster.

The Contractor must, at his expense, provide and maintain barricades, signals and employ the guards necessary to divert traffic and prevent any deterioration of the paving bed and prevent the formation of ruts during the work.

The owner reserves the right to stop the work if the atmospheric conditions do not seem suitable to him.

If traffic is allowed on a given section before the installation of the upper layer, the surface of the lower layer must be thoroughly cleaned before the installation of the one which is to cover it.

5.11 HAND TOOLS

The pestles used to compact the mixture in places inaccessible to the rollers must weigh at least 10 kg / cm². The pestles can be replaced by mechanical compactors, approved by the Engineer. The Contractor must have at his disposal a rule of three (3) meters provided with a level to check the uniformity of the coating.

5.12 CLEANING OF HAND TOOLS

When hand tools are cleaned in a fire, the Contractor must take care not to bring them to temperatures high enough to burn the mixture. When hand tools are cleaned with oil, the oil container is placed in a location such that the mixture cannot be damaged. The cleaning operations are done in one place.

5.13 LONGITUDINAL AND CROSS-SECTIONAL JOINTS

The longitudinal joints must be parallel to the lines of the layout. The laying of the mixture at the end of the day is arranged so as not to leave a longitudinal joint to be completed the next day. Between the new and the old roadways or between the works of two (2) consecutive days, the joints are made in order to ensure a perfect, continuous and waterproof connection. Any transverse or longitudinal cold joint whose temperature is below 40 ° C must be painted with a uniform layer of emulsion or liquid bitumen. The Contractor must do everything in his power to prevent cold seals from being made.

5.14 JOINTS IN THE BINDER LAYER (BASE)

When the laying of the binder layer is suspended, the Contractor must, before resuming the laying work, bring the end of the layered layer to the full specified thickness, then place the hot mixture in close contact with the exposed edge of this layer so that after rolling, there is a perfectly united joint.

5.15 SEALS IN THE WEAR LAYER

When the installation of the wear surface is interrupted for a considerable time, the applied surface must be completely cylindrical and its edge immediately cut, so as to have a vertical joint with a rough surface over the entire thickness of the surface layer.

5.16 JOINTS WITH EXISTING PAVEMENT

The edge of the paving already laid must be cut (saw cut) over its entire thickness and brushed with a thin and uniform layer of liquid asphalt to expose a surface against which the hot mixture must be laid and raked to the thickness desired. Pestles and hot irons should be used with caution so as to heat the old pavement enough to secure a bond. At the point of connection between a new paving and an old paving, the Contractor must take care to make an adequate joint and, to do this, must cut the old paving of a depth of 5 cm and a length of 1 m on the whole width of this old paving.

The notch thus made must be coated with a special binder and new paving.

6.0 PAVEMENT MARKING

6.1 MATERIALS

The marking product must be in alkyd conforming to the standard 10201 Alkyd paint for road marking and registered on the approval list of the Quebec Ministry of Transport. The Contractor must ensure that the product used is suitable for the use for which it is intended, considering the type of coating (coated), the texture of the coating and other surface conditions.

The Contractor must provide the City, from the first site meeting, with the technical sheets.

6.2 IMPLEMENTATION

In addition to the conditions of application of article 16.9.2.3.1 of the 2018 C.C.D.G, the Contractor must ensure that the following additional conditions are met:

- The marking product must not be applied to the longitudinal joints of the roadway or to crack sealant; and
- The marking product must not be applied to existing marking materials;
- Pavement marking must not be carried out if the paving temperature is below the dew point + 2 ° C.

If the roadway is contaminated with various dirt detrimental to the marking, the Contractor must then sweep and remove the excess dust before proceeding with the marking.

6.3 ALIGNMENT

Longitudinal alignment of the lane marking must not deviate more or less 25 mm transversely from the marking plane.

The position of a mark with a length of less than 3 m must not deviate longitudinally by plus or minus 25 mm from the marking plane. For a mark longer than 3 m, this precision is more or less 50 mm.

The length of a mark must not vary more or less 25 mm from the length provided for in the contractual documents.

6.4 BRAND DIMENSIONS

The dimensions of the marks must comply with the requirements of Chapter 6 "Marks on the roadway" of Volume V - Road signs from the Normes - Ouvrages routiers collection of the Ministère des Transports, as well as the requirements of the City where the work is carried out. (see map)

Unless otherwise specified in the marking plan, the width of the marking lines must be between 120 and 125 mm.

The spacing between the marking lines is between 120 and 125 mm.

The length of the axial lines must be 3 m followed by a spacing of 6 m.

6.5 SPACE

The spacing between the lines and the marking of the hatched areas of the headers must be carried out according to the standard plans.

7.0 EXISTING SIGNALING

The Contractor is responsible for removing, moving and reinstalling existing signage. The cost of this work is included in its unit price for signage.

8.0 MAINTENANCE AND REPAIR BEFORE FINAL ACCEPTANCE OF WORK

During the warranty period, the Contractor will carry out all repairs deemed necessary by the Engineer. If he does not comply with the requisitions of the Engineer on this subject, the latter, after having notified the Contractor in writing to perform the said work within the following four (4) days, will take the necessary measures to have these works carried out. repairs at the Contractor's expense and expense.

9.0 CURBS, SIDEWALKS AND SLABS

9.1 GENERAL

Sidewalk and curb work must be done in accordance with BNQ 1809-500 / 2006. The exterior slabs will be built to the same construction and quality requirements as the sidewalks of this specification with the exception of the joints. Dimensions and slopes are as specified on the plans.

9.2 CEMENT CONCRETE

Concrete must meet the requirements of the most recent edition of CSA23.1.

9.2.1 PORTLAND CEMENT

Generally, GU type cement with cement addition should be used. All Portland cements must meet the CSA-A5 standard, latest edition.

Compound hydraulic cements and cement additions must be approved by the Engineer. They must respectively comply with CSA-A362 and CSA-423.5 standards.

9.2.2 CLASSIFICATION BY EXPOSURE

The exposure classes are determined according to CSA A-23.1, i.e. class C-2

9.2.3 AGGREGATES FOR CEMENT CONCRETE

The aggregates used in concrete must comply with BNQ 2560 114/2002.

9.2.4 WATER

The water used in concrete mixing must be clean and free from oil, vegetable matter, acids or alkalis.

9.2.5 AIR-CONCLUDING AND DISPERSING AGENT

All air blocking agents used in the manufacture of concrete must comply with the requirements of CSA-A23.1, latest edition and their use as well as the dispersing agent must be approved by the Engineer.

9.2.6 QUALITY OF CEMENT CONCRETE

Concrete must have a minimum compressive strength of 35 MPa at twenty-eight (28) days and be proportioned so as to meet exposure class C-2 of CSA standard A23.1. The maximum aggregate will be 20 mm and the air content in the concrete will be 5 to 8%. Concrete subsidence should not exceed 110 mm without being less than 50 mm for sidewalks.

The mixing formula must be submitted and accepted by the Engineer.

9.3 FRAME

When indicated on the plans, reinforcing steel must be supplied and installed; the latter must meet the requirements of ACNOR G40.18 for a grade of 400 MPa. The overlaps are in tension and 740 mm. for the 15M bar. The covering of the steel must meet the requirements of standard CSA23.1. The steel must be free of excess rust, sips, paint or any coating which will tend to reduce or destroy its bonding force. The wire mesh must be in sheet form and meet the same standard as reinforcing steel.

9.4 DIMENSION OF SIDEWALK TILES

Sidewalk tiles should not be more than 1500 mm in length and 1200 mm in width. The exact dimensions will be as described in the sections and details shown on the plans.

9.5 SIDEWALK JOINTS

9.5.1 GÉNARILITÉ

The Contractor must make different types of joints in the sidewalks. For the method and location of these joints, the contractor must refer to the standard figures of BNQ 1809-500 / 2006 and the plan.

9.6 FORM

Formwork must be done according to BNQ 1809-500 / 2006.

9.7 CONCRETE

9.7.1 CONCRETE WORK

Before the concreting work, a suitable watering of the stone foundation will be carried out. The fresh concrete will be placed on the stone foundation as close as possible to its final position. It will be well packed, especially near the formwork and joints to eliminate voids.

Concrete will be laid at least 10 mm higher than the final surface to allow for proper adjustment.

The concrete should not be placed on a frozen foundation. For protection in cold weather, the Contractor must refer to standard CSA A23.1, latest edition.

9.7.2 CONCRETE FINISHING

The concrete surface will be leveled by means of a leveling slat resting on the chests so as to obtain the desired level and fine with a wooden trowel, taking care not to attract too much "laitance" to the surface. Before the concrete makes its initial setting, we will resume the finish by passing a second time the wooden trowel so as to eliminate, on the surface, irregularities, depressions or any other defect.

When the concrete has reached a certain consistency, the edges of the slabs will be rounded to the surface with the appropriate tools. Following these operations, we will resume the finishing of all edges. In no case will the steel trowel be allowed for finishing the concrete.

9.7.3 CURING AND PROTECTION

Immediately after finishing operations and when the concrete has set sufficiently, the sidewalk surface must be cured according to the provisions of CSA A23.1.

The method of ripening chosen by the Contractor will be subject to the approval of the Engineer and the curing agent, type, method and rate of application must also be subject to the approval of the Engineer. The concrete surface must be protected by a burlap so as not to be damaged by heavy rain. The Contractor must obtain enough tarpaulins (canvas or jute) to completely cover all the sections that have been poured during the previous eight (8) hours. The Contractor shall erect and maintain suitable barriers to protect the sidewalk from damage during a period of seventy-two (72) hours following the placement of the concrete. At his expense, he must repair or replace any section that has been damaged before final acceptance, to the satisfaction of the Engineer.

9.7.4 COLD WEATHERING CONCRETE

If, during the execution of the work, the temperature drops to 5oC or if the Engineer has reason to believe that within twenty-four (24) hours the thermometer will drop to this point, the water and the aggregates must be heated and the necessary precautions must be taken to keep the fresh concrete between 15 and 25oC and the hardened concrete at a minimum of 10oC for five (5) days then, above the freezing point the two (2) following days . The addition of calcium chloride is prohibited.

The Contractor must take all necessary precautions, both in the choice of cement and other materials and in its execution procedures, so that the wear surfaces and all surfaces exposed to the weather do not flake and remain healthy and acceptable until the expiration of the warranty period, even if the Owner uses sodium chloride and / or calcium during the winter for the maintenance of sidewalks and curbs.

The Contractor may not discharge the obligations imposed on him by this clause on the pretext that the materials and mixtures were unsatisfactory at the time of construction

9.7.5 HOT WEATHERING CONCRETE

At all times, the temperature of the mixture during installation must be below 30oC. If necessary, the supervisor may require the addition of a setting delay agent to facilitate the setting in curve and the finishing.

9.7.6 INSPECTION

The Contractor shall not undertake any concrete pouring before the Engineer has completed the inspection of the formwork and the foundation.

The Contractor must notify the Project Manager sufficiently in advance (at least twenty-four (24) hours) during each concrete pour, so as to give him time to carry out his inspections.

9.8 DRIVEWAY

The Contractor shall not undertake any concrete pouring before the Engineer has completed the inspection of the formwork and the foundation.

The Contractor must notify the Project Manager sufficiently in advance (at least twenty-four (24) hours) during each concrete pour, so as to give him time to carry out his inspections.

9.9 RAMPS FOR THE DISABLED

Where specified in the plans, the Contractor will refer to the standard figures and other articles of this chapter, if applicable, for the construction of ramps for the disabled.

9.10 PEDESTRIAN TRAFFIC

During the execution of its work, the Contractor will take all necessary measures to facilitate the movement of pedestrians. It will also be required to install temporary walkways over its fresh concrete or sidewalk forms, to allow residents continuous access to their property.

These temporary walkways should not, however, rest either on the concrete or on the sidewalk forms, but on external supports, on each side of the forms. They must also be installed according to known safety standards. At all times, the Contractor shall comply with the decisions of the Engineer or his representative on these installations.

9.11 REPAIR OF EXISTING SIDEWALKS AND / OR EDGES

In accordance with these specifications and in the event that the Contractor must remakedriveways or a sidewalk and / or curb section while the sidewalks and / or curbs are already existing, the repair work will include the demolition of the sidewalks and / or existing curbs, as well as adjacent bituminous concrete if applicable. The works will also include the transportation of debris, the preparation of the foundation and the surface, the formwork, concreting, formwork removal, protection, granular filling in the street and its compaction as well as the installation of bituminous concrete and / or peat all to restore the street and the land adjacent to their original state.

9.11.1 CONCRETE SAWING

For the removal of existing sidewalks and / or curbs, the Contractor must saw the concrete vertically at each end. In the case of edges to be removed, the upper 300 mm must be sawn while the lower part can be broken in another way.

9.11.2 ASPHALTIC CONCRETE

The bituminous concrete will be of the EB-10C type used and will comply with the specifications of the CCDG of the MTQ latest edition.

9.12 ACCEPTANCE CRITERIA AND REVIEW OF THE UNIT PRICE

9.12.1 COMPRESSION RESISTANCE REQUIREMENTS

Compressive strength is determined from specimens matured under standard conditions. Concrete sampling and testing are performed in accordance with CSA-A23.2, latest edition.

Concrete acceptance is based on the average compressive strength and the results dispersion index established from batches.

9.12.2 DEFINITION OF LOTS

Samples are taken either on all deliveries, or randomly depending on the quantities used on the site, or depending on the formation of lots, all decided during a site meeting prior to the work. At least one (1) sample is taken every 75 m³. One lot represents 450 m³ or less of concrete. The batches are formed by class of concrete (strength), by type of mixture and by supplier, and separated by categories of work.

The batches are formed according to the chronology, in groups of two (2) to twenty-four (24) results, provided that the total quantity of the batch does not exceed 450 m³ and that no more than thirty (30) days between the taking of the first and last samples from a batch.

9.13 CALCULATION OF THE REVISED UNIT PRICE IN THE CASE OF NON-CONFORMING RESISTORS

9.13.1 UPPER RESISTANCE LIMIT

To calculate the average concrete resistance of a unit batch, specimens having a resistance greater than 150% of the specified resistance are considered to have a resistance equal to 150% of the specified resistance.

9.13.2 CONCRETE OF RESISTANCE SUPERIOR TO THE SPECIFIED RESISTANCE

There is no overpayment for concrete which, per unit batch, has a strength greater than the specified strength.

9.13.3 CONCRETE RELEASE

When the measurements indicate that the resistance of a sample is less than 76% of the specified resistance, the concrete represented by the sample is not paid.

In the event that part of the concrete in a batch is rejected, the average strength of the remaining batch is calculated by excluding the samples representing the part of the batch rejected. The average tolerable resistance is that fixed by the number of samples (next sub-article).

9.13.4 ACCEPTANCE OF A LOT

A batch is accepted when the average resistance measured is equal to or greater than the average tolerable resistance (R_t) found using the following formula:

$$R_t = flc + (kd/100)$$

Or

flc: Specified resistance

d : Dispersion index of the batch samples according to the following equation:

$$d = \sqrt{\sum_{i=1}^n \left[\frac{(R_i - R)^2}{n-1} \right]}$$

or

R_i : Resistance of each of the samples

R : Average measured resistance of the batch

n : Number of samples in the batch

k : Acceptance factor according to the number of samples in the batch

The “k” values are shown in the following table:

Number of samples (n)	Acceptance factor (k)
2	-88
3	-9
4	10
5	19
6	26
7	31
8	34
9	38
10	41
11	43
12	45
13	47
14	49
15	50
16	52
17	53
18	54
19	55
20	56
21	57
22	58
23	59
24	60

9.13.5 REJECTION OF A LOT

If the average resistance of a batch is less than the critical resistance, ie 80% of the specified resistance, the concrete is refused and the work must be taken back at the Contractor's expense.

8.12.3.6 Difference between the results of two specimens

If the average resistance of a lot is between the average tolerable resistance and the critical resistance, the unit price (PU) is adjusted using the following formula:

$PRr = PU \times (R/Rt)$ For Category A works

Ou

$PRr = PU \times (R/Rt)$ For Category B works

Ou

PRr : Revised price for resistance

PU : Cement concrete unit price, i.e. unit price of the slip to which protection costs are added

Rt : Average tolerable resistance

R : Average resistance measured

9.13.6 Category

All structural concrete or exposed to freeze-thaw cycles or the action of de-icing salts, correspond to category A.

The other concretes correspond to category B.

9.14 WARRANTY

The Contractor must guarantee that the sidewalks, as constructed, will cost the Owner nothing for repair costs during a period of twelve (12) months from the date of provisional acceptance.

At the end of this period, the Contractor must restore its work to be accepted definitively.

9.15 MAINTENANCE AND REPAIR BEFORE FINAL ACCEPTANCE OF WORK

During the warranty period, the Contractor will carry out all repairs necessary asked by the engineer. If he does not comply with the requisitions of the Engineer on this subject, the Engineer, after notify by writing the Contractor to do the work within the following four (4) days, will take the necessary measures to have these works carried out at the Contractor's expense and expense.

10.0 SODDING

10.1 GENERAL

All the prescriptions of the general specification NQ 0605-100 "Landscaping using plants" form an integral part of this tender document and must be fully followed with the details of this section.

The maintenance of grassed surfaces must be done during 15 calendar days (watering, cutting, etc.) from the date of the end of installation date.

10.2 SITE EXAMINATION

Notify the Client in writing of any situation he notices on the site, before or during the work, which could affect the work in this section. Stop work until the situation has been inspected and corrected. The beginning or the continuation of the works implies that the Contractor cannot make any claim which may result from any situation which he has thus accepted.

Notify the Contracting Authority in writing when the work is completed.

10.3 INSPECTION

The inspection for acceptance of this work takes place within forty (40) days after the notice has been sent.

10.4 PLANT LAND TESTS

The topsoil supplied by the Contractor must be analyzed at the Contractor's expense by a specialized laboratory and accepted by the Contracting Authority before the start of the work. The laboratory must provide the results of the analyzes, in writing, whether or not compliant.

The topsoil must be composed of a homogeneous mixture corresponding to silty sand and meeting the physical and chemical requirements of standard NQ 0605-100.

11.0 LOCAL REPAIRS

11.1 GENERAL

All the prescriptions of the general specification NQ 0605-100 "Landscaping using plants", of chapter 13 "Asphalt pavement" of the CCDG and BNQ 1809-500 "Sidewalks and curbs" are an integral part of this document and must be followed in full with the details in this section.

11.2 SCOPE OF WORK

All places (grass, hedge, tree, shrub, curb, sidewalk, post, paving, etc.) damaged by the Contractor during the work must be repaired by the latter, to the satisfaction of the engineer.

After repairing the curbs and sidewalks, the Contractor must put in place, behind them, class

"B" equipment accepted by the Contracting Authority if no lawn exists. For all sections of lawn that will have been affected, the Contractor must install sod and 150 mm thick topsoil to restore the affected areas to their original state. During this filling at the back of the curbs, the Contractor must adjust the water service box.

After all the granular foundation, paving and sidewalk work, the Contractor must ensure that the sumps, manholes and sewers are properly cleaned (sanitary, rain, combined). The Contractor must include these costs within the articles of the bid schedule.

11.3 PRIVATE ENTRY REPAIR

The repair of private entrances is carried out over the entire right of way, and this, over the full width of the entrance. All damage caused outside this surface is subject to the prescriptions of the previous article.

It is possible that the repairs to the private entrance extend over a larger area than that affected by the work (in order to properly reshape the entrances). The Contractor must therefore plan the removal and disposal of existing paving and/or concrete when this situation arises.

Private entrances can be concrete, bituminous concrete, decorative concrete paving while including concrete or wooden edges and walls, hedges, shrubs and fences, etc.

11.4 RECOVERY OF PREMISES

The contractor must provide for the restoration of the premises affected by the work without limitation; he must provide for the following repairs;

Turf

1. The repair works are as indicated on the plans, ie the restoration of the surfaces currently in turf;
2. Repair work on private land must be carried out to the most distant place damaged by the work or to the place indicated by the Project Manager when land reprofile work is necessary following the change of geometry;
3. 150 mm of topsoil must be provided and installed before laying the sod.

Hydraulic seeding

- The seeding work must be carried out in the places where the ditch was repaired. The surface of agricultural land must be covered with 150 mm of topsoil (ideally the same pickling soil as before the work). All other surfaces that are not sodded must be seeded to the most distant place, damaged by the work or to the place indicated by the engineer when ground reprofile work is necessary following the change of geometry;
- 150 mm of topsoil must be supplied and installed before the hydraulic seeding operation; and

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- Repair work on land other than that specified in a) must be carried out on all the part damaged by the work or because of the work.

Hedges, shrubs, trees

- Adequate removal and storage;
- Digging where hedges, shrubs and trees are to be replaced;
- Adding topsoil;
- The required fertilizer;
- Replacement of broken plants.

Borders, sidewalks

- The removal and off-site disposal of the part damaged or removed during the work;
- Reconstruction of new curbs and sidewalks including expansion joints.

Crushed stone entrance and paving

- Removal and off-site disposal of existing paving;
- Reconstruction of the granular foundation according to the types and thicknesses specified;
- The laying of a layer of paving, according to the thickness specified on the plans

Fence, barrier, etc.

- Dismantling of fence barriers, bollards, jersey
- Storage and protection during works and;
- Replacement at the end of the work

12.0 CHAIN-LINK FENCE

12.1 CHAIN-LINK FENCE

The fences will be of the galvanized chain link type covered with black vinyl with 50 mm mesh. The wire mesh must meet the requirements of CAN / CGSB-138.1.

12.2 WIRE

In chain link and will be galvanized by immersion after weaving. The final size must be 6 (5.0 mm). The upper and lower selvages have folded ends. Each strand must be able to withstand a tensile test of 552 MPa. The galvanized mesh must contain an average of 490 g / m² of zinc.

12.3 INTERMEDIATE POST

Standard tube continuously welded, galvanized, of nomenclature 40, with external diameter of 60.3 mm, total length before installation 850 mm longer than the height of the mesh and minimum weight 5.4 kg / m. The open joint pipe or tube is prohibited. The maximum spacing is 3 m between the posts.

12.4 END, ANGLE AND REINFORCEMENT POST

End, corner and reinforcement posts: standard tube, continuously welded, galvanized, nomenclature 40, external diameter 88.9 mm. Total length before laying 1,050 mm longer than the height of the mesh. Minimum weight 11.22 kg / m. The open joint pipe or tube is prohibited.

Hat and intermediate post

Stamped steel, malleable or non-malleable iron, galvanized. Must fit a top rail with an outside diameter of 42.9 mm in a horizontal position.

12.5 UPPER CROSSING

Galvanized tube, outside diameter of 42.9 mm, simple ends, standard length, nomenclature 40, standard continuous welding, or hollow profile with high resistance of 2.54 mm wall, with mechanical properties similar to those prescribed by the standard ASTM A-367-60 (2005). The open joint pipe or tube is prohibited.

Galvanized fittings of the outer sleeve type and a length of at least 180 mm are used to join two (2) sections of upper crosspiece. The top rail must pass through the cap of the intermediate post and form a continuous element for each section of fence. In addition, this cross must be secured to each end post using a push-in fitting.

12.6 BRACE

The spacer has an outside diameter of 42.9 mm galvanized. Same specifications as for the top rail. The horizontal spacer is placed halfway between the top rail and the bottom of the fence and connects the end post to the first adjacent intermediate post. The end and barrier posts must have one (1) spacer compared to two (2) for the corner and reinforcement posts.

12.7 ACCESSORIES

Pressed galvanized steel, aluminum or non-metallic molded parts strong enough to ensure the solidity of the fence.

12.8 GRILL FASTENER

The mesh is attached to the top rail and the spacers with an appropriate tie wire at intervals of approximately 450mm. It must also be fixed to the terminal and intermediate posts at 300 mm intervals.

12.9 TENSIONING WIRE

Six-gauge solid core wire (5 mm), galvanized, 610 g / m², should be stretched at the bottom of the mesh and tied at intervals of about 450 mm. The height from the natural terrain is 50 mm.

12.10 CONCRETE BASES

Concrete with a minimum strength of 32 MPa, minimum dimensions of the wheelbase of intermediate posts of 250 mm in diameter and 1,300 mm in depth, minimum dimensions of the wheelbase of end posts of 300 mm in diameter and 1,200 mm depth.

12.11 GENERAL NOTES

The Contractor must supply and install on all posts, galvanized cast iron or cast aluminum caps.

The Contractor must supply and install all accessories, steel wires, bolts, etc., required for the careful execution of the project.

All the elements, including all the accessories mentioned above and required for the execution of this project must be hot dip galvanized according to ASTM A-123-M-02 standards, at a rate of 610 g / m².

The steel wire must be subjected to at least five (5) immersions in the zinc bath.

All scratches on the various elements of the fence during installation must be carefully stripped and covered with three (3) coats of 96% zinc base metal paint (cold galvanized or equivalent).

13.0 SPECIFIC TECHNICAL ENVIRONMENTAL CLAUSES

13.1 PROTECTION OF THE ENVIRONMENT

Throughout the duration of the contract, the contractor must ensure that all persons under his responsibility take all necessary measures to protect the environment. More specifically, he must:

- Ensure that there will be no storage of materials, no circulation of machinery, no digging of trenches or any other unauthorized intervention that could damage or modify lakes and watercourses with regular or intermittent flow, their banks and their respective flood plains or adjacent or isolated wetlands (ponds, marshes, swamps or peat bogs);
- Respect all the easements shown on the plans and take the necessary measures to prevent the machinery from circulating outside the easements that have been assigned to it. In no event shall the Contractor be authorized to negotiate additional easements on the lakes and watercourses, their respective shores and floodplains or in the adjacent or isolated wetlands;
- Preserve on the site all vegetation such as trees, shrubs and other herbaceous plants (including grassy areas) that do not interfere with the work. If the contractor damages the vegetation outside the planned easement, he must replace it at his expense, unless the restoration is included in the work (see section "Conservation of trees");

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- Proceed as soon as possible and as the work progresses to restore disturbed areas (eg stabilization and revegetation of slopes and bare soils). Vegetation of disturbed soils should be done with native species preferably. The restoration elements must ensure that the environment will be equivalent or improved compared to the situation prior to the intervention;
 - Make sure not to throw, spill or allow to escape onto the ground or into waterways organic or inorganic materials or petroleum products and their derivatives (antifreeze or solvent). An intervention kit for the recovery of hazardous materials must be present on the site. Any spill of contaminants must be the subject of immediate response measures to confine, recover and dispose of the products in accordance with the Environment Quality Act (EQA) and the policies and regulations of the Minister du Sustainable Development, Environment and the Fight against Climate Change (MELCC) in the manner approved by the engineer. In all cases of spills, Urgence-Environnement must be notified immediately at 1-866-694-5454, in accordance with section 21 of the LQE;
 - Maintain machinery (oil change, etc.) at a minimum distance of 30 m from a lake, stream or wetland (ponds, marshes, swamps or peat bogs). The machinery must be cleaned to remove excess oil or grease before starting shore work, and it must also be inspected regularly for leaks. Biodegradable hydraulic fluids are recommended for work in these sensitive environments or near them;
 - Clean the machinery before arriving at the work site to remove the mud, plant fragments and animals attached to it;
 - Do not use pesticides (herbicides, fungicides, insecticides, etc.), unless you have obtained appropriate authorization from the regional directorate of the MELCC.
 - Take all the necessary measures and build all the necessary facilities and use the appropriate mitigation measures to avoid contamination of lakes and streams with new, used or excavated materials found on the site;
 - When there is pumping of the water found at the bottom of an excavation or work area, pumping water can be discharged directly into the watercourse if it does not contain suspended solids beyond the background noise and visible to the naked eye. Otherwise, the contractor must provide a system to avoid the suction of sediment and discharge water into an infiltration area, outside the shore of any lake or watercourse. However, if the amount of water pumped is too large for it to fully infiltrate the soil before it reaches the water body, then the water must be pumped into a sedimentation tank. The sedimentation basin must be set up outside the shoreline of the lake, watercourse or wetland (pond, marsh, swamp or bog). The water discharged at the outlet of the sedimentation tank must not contain suspended matter beyond the background noise and visible to the naked eye;
 - Use recognized control methods to avoid or control the production of dust and smoke and any atmospheric pollution on the work site. The dust suppressants used must comply

13.2 MANAGEMENT OF EXCAVATION AND BACKFILL MATERIALS

Throughout the duration of the contract, the contractor must ensure that any person under his responsibility takes all the measures necessary to adequately dispose of excavation and backfill materials. More specifically, he must:

- Ensure that all excavated materials that are not reused, including in particular sawn timber, rubble and plaster, concrete and masonry pieces as well as pieces of paving, are managed (by treatment, recovery or disposal) in accordance with Environment Quality Act, Regulation respecting the burial and incineration of residual materials and the Regulation respecting hazardous materials. If necessary, the contractor must himself find the place of disposal and submit it to the approval of the engineer;
- Ensure that all excavation and backfill materials are managed in accordance with the interim grid for the management of excavated contaminated soil presented in the Policy for the protection of soil and the remediation of contaminated land, the Regulation respecting the burial of contaminated soil and the Regulation respecting the storage and transfer centers of contaminated soil;
- Ensure that excavation materials are available outside lakes and watercourses with regular or intermittent flow, their respective shores, flood plains and wetlands;

Provide the engineer with written proof that the materials from the site have been deposited in an authorized location.

13.3 DISPOSAL OF EXCAVATION SURPLUSES

All of the cuttings storage and disposal sites (excavation surplus excluding any waste) envisaged for the realization of this contract must be approved beforehand by the engineer, at the latest at the first site meeting. No disposal of these materials can be made without obtaining this approval.

All excess excavation disposal sites will be subject to adequate leveling and revegetation to the satisfaction of the Consultant.

Excavation surpluses must be placed outside the aquatic environment as defined above and including any wetland, any shore, any coastline, any flood plain as well as the bed of any body of water.

13.4 PRESERVATION OF TREES

The Contractor is held responsible for any damage caused to the trees to be preserved located on all the sites of the contract and must replace each damaged tree either by a tree of the same essence and of the same dimension, or by a tree of the same essence of 150 mm diameter and eight meters in height, and must guarantee its survival for a period of two years after acceptance of the contract.

The trees to be protected must also have a protected area around them, with a radius of five meters.

In the event that this minimum surface cannot be respected, the following technique must be applied which minimizes soil compaction, the effects of which are harmful to the health of trees: it involves spreading over the surface used, a non-woven geotextile membrane and place a 20 cm high earth cushion on it.

When there is an accidental nick of part of the root system, which is observed only during the execution of the work, an equal portion of branches must be pruned by a specialist.

A specialist must see the pruning and the necessary care during the works. The specialist's contact details must appear on the list of subcontractors.