TENDER DOCUMENTS

SUBSECTION 6.21
DEMOLITION AND REMOVAL

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SUBSECTION 6.21 DEMOLITION AND REMOVAL

6.21.1 GENERAL

6.21.1.1 This subsection describes the requirements relating to the demolition and removal work covered by this Contract. That work includes the selective or mass demolition of concrete, removal of asphalt pavement, removal of deteriorated or obsolete structural elements or components and the permanent or temporary removal of equipment for the purpose of repairing the structures in accordance with the requirements of this Contract.

6.21.1.2 The demolition areas or the elements, components and equipment to remove that are shown on the drawings are approximate. The exact scope of the demolition and removal work that shall be carried out by the **Contractor** will be determined on site by the Engineer.

6.21.1.3 The debris shall be removed and disposed of in accordance with subsection 6.13 *Environmental Protection*.

6.21.1.4 The requirements relating to the waterproofing membrane are described in subsection 6.64 Deck *Waterproofing Membrane*.

6.21.1.5 The **Contractor** shall repair, at its expense, any structure or part of a structure damaged during the work.

6.21.1.6 The **Contractor** shall repair, at its expense, any part of a structure that has been demolished beyond the limits indicated on the drawings or authorized by the Engineer.

6.21.1.7 At least fourteen (14) days prior to the start of demolition work, the **Contractor** shall submit to the Engineer, for review, the drawings and diagrams describing clearly and in detail the order in which the demolition and removal work will be carried out, as well as the temporary access structures, including the design notes, in accordance with subsection 6.15 *Temporary Structures*.

6.21.1.8 The **Contractor** shall take such measures as are necessary to enclose the work area and protect the public, workers, roadway traffic (vehicles, pedestrians and cyclists) and marine traffic, as well as the various elements of the structures to be preserved or recovered. The **Contractor** shall, where necessary, use protective screens to eliminate dust and flying debris while demolition is being carried out.

6.21.1.9 The **Contractor** shall at all times protect the existing structures that shall remain in place (drains, electrical equipment or other) and the materials to be preserved or recovered, notably the reinforcing steel, sheaths and prestressing cables.

6.21.1.10 If any of the structures to be preserved or recovered are damaged, the **Contractor** shall, upon notice from the **Owner**, proceed immediately to the replacements and repairs necessary to the satisfaction of the Engineer, at no additional cost to the **Owner** or bear the costs of replacement or repair that will have been carried out by the competent authority concerned.

6.21.1.11 With regard to the Champlain Bridge deck, the **Contractor** shall take all necessary measures to protect the instrumentation elements and real-time data acquisition station on the performance of certain girders, including housings and wiring. For every girder where interventions to existing instrumentations elements are required, the **Contractor** shall, with prior notice of at least fourteen (14) days to the Engineer, identify the girder in question and provide the dates of commissioning and removal of the corresponding access devices in order to allow the **Owner** to remove and reinstall these elements.

6.21.1.12 While concrete demolition work or work on reinforcing steel is being carried out, the structural integrity of all the components of the bridge or of the structure shall be maintained at all times by shoring or other appropriate means authorized by the Engineer.

6.21.2 MEASUREMENT UNITS

6.21.2.1 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
length	micrometer	µm
area	square meter	m^2
volume	liter	L
mass	kilogram	kg
mass	milligram	mg
mass	ton	t
pressure	megapascal	MPa
angle	degree	°
energy	joule	J
time	minute	min
speed	meter per second	m/s
speed	kilometer per hour	km/h

6.21.3 LABOUR, EQUIPMENT AND TOOLS

6.21.3.1 The **Contractor** shall carry out the demolition and removal work using experienced personnel with at least five (5) years of experience in this type of work and with the use of the appropriate equipment and tools. The equipment used shall not damage the parts of the structure to be preserved.

6.21.3.2 The **Contractor** shall provide the list of the equipment, including the specialized equipment, that it intends to use. The equipment shall enable the safe demolition of the concrete, underwater concrete and concrete in drawdown zones. The equipment and tools shall be accepted by the Engineer.

6.21.3.3 The **Contractor** shall not use explosives to demolish the concrete.

6.21.3.4 The use of hydraulic hammers, as part of the demolition and removal work, is subject to the following restrictions, which are function of the structures to demolish:

6.21.3.4.1 Complete demolition of a slab on girders

6.21.3.4.1.1 For a slab on concrete girders, the **Contractor** shall use, up to 300 mm from the girders and diaphragms, a hydraulic hammer whose impact energy per stroke is less than 200 J and which is mounted on a carrier vehicle having a mass less than 1,500 kg.

6.21.3.4.1.2 For a slab on steel girders, the **Contractor** may use, up to 100 mm from the girders and diaphragms, a hydraulic hammer whose impact energy per stroke is less than 350 J and which is mounted on a carrier vehicle having a mass less than 3,000 kg.

6.21.3.4.1.3 For the concrete demolition located close to and above the girders and diaphragms, the **Contractor** shall use a hydraulic hammer whose impact energy per stroke is less than 60 J and which is mounted on a carrier vehicle having a mass less than 1,000 kg.

6.21.3.4.1.3.1 The demolition of the concrete above the girders and diaphragms with the pneumatic hammer shall be limited to the concrete located above the lower row of reinforcing bars.

6.21.3.4.2 Demolition of the outer side of a slab on girders

6.21.3.4.2.1 For the demolition of the outer side of a slab on girders, the **Contractor** shall use, up to 300 mm from the concrete edge girders or up to 100 mm from the steel edge girders, a hydraulic hammer whose impact energy per stroke is less than 350 J and which is mounted on a carrier vehicle having a mass less than 3,000 kg.

6.21.3.4.3 Demolition of a curb, sidewalk or bicycle path with with overlay on a slab

6.21.3.4.3.1 For the demolition of a curb, sidewalk or bicycle path with overlay on a slab, the **Contractor** may use, in lieu of a pneumatic hammer, a hydraulic hammer whose impact energy per stroke is less than 60 J and which is mounted on a carrier vehicle having a mass less than 1,000 kg.

6.21.3.4.4 Demolition of a concrete barrier on slab

6.21.3.4.4.1 For the demolition of a concrete barrier on slab, the **Contractor** shall use a hydraulic hammer whose impact energy per stroke is less than 350 J and which is mounted on a carrier vehicle having a mass less than 3,000 kg.

6.21.3.4.4.1.1 The last 100 mm of the concrete barrier adjacent to the slab shall be demolished with a hand held pneumatic hammer weighing no more than 15 kg.

6.21.3.4.5 Demolition of a deck joint

6.21.3.4.5.1 For the demolition of a deck joint, the **Contractor** shall use, for the deck shoulders and the slab adjacent to the joint, a hydraulic hammer whose impact energy per stroke is less than 60 J and which is mounted on a carrier vehicle having a mass less than 1,000 kg.

6.21.3.4.5.1.1 For the concrete at and under the lower reinforcement layer of the slab located above the girders and diaphragms, the **Contractor** shall, in no case, use a hydraulic hammer.

6.21.3.4.5.2 For the demolition of the upper part of the backwall in which the joint is integrated and whose thickness is less than 450 mm, the **Contractor** may use, up to 100 mm from the concrete to be preserved, a hydraulic hammer whose impact energy per stroke is less than 60 J and which is mounted on a carrier vehicle having a mass less than 1,000 kg.

6.21.3.4.5.3 For the demolition of the upper part of a backwall in which the joint is integrated and whose thickness is at least 450 mm, the **Contractor** may use, up to 100 mm from the concrete to be preserved, a hydraulic hammer whose impact energy per stroke is less than 200 J and which is mounted on a carrier vehicle having a mass less than 1,500 kg.

6.21.3.4.5.4 For the demolition of the steel components of a deck joint and including those integrated into a curb or sidewalk, the **Contractor** shall use a hydraulic hammer whose impact energy per stroke is less than 200 J and which is mounted on a carrier vehicle having a mass less than 1,500 kg.

6.21.3.4.6 Demolition of a transition slab

6.21.3.4.6.1 For the demolition of a transition slab, the **Contractor** shall use, up to 300 mm from the backwall, a hydraulic hammer whose impact energy per stroke is less than 350 J and which is mounted on a carrier vehicle having a mass less than 3,000 kg.

6.21.3.4.7 Complete demolition of a deck

6.21.3.4.7.1 For the complete demolition of a deck, it is prohibited to use a hydraulic hammer whose impact energy per stroke is greater than 1,000 J or a hydraulic hammer mounted on a carrier vehicle having a mass greater than 10,000 kg.

6.21.3.4.8 For the demolition of the concrete above the first reinforcement layer of the bridge concrete elements other than the girders, diaphragms, columns, seat blocks, pier caps and other thin and slender elements, the **Contractor** shall use a hydraulic hammer whose impact energy per stroke is less than 60 J and which is mounted on a carrier vehicle having a mass less than 1,000 kg.

6.21.3.4.9 For the demolition of the concrete above the first reinforcement layer in areas of delaminated or concrete repair without overlay of portions of foundations, abutments, piers or walls having a thickness of at least 450 mm, the Contractor shall use a hydraulic hammer whose impact energy per stroke is less than 200 J and which is mounted on a carrier vehicle having a mass less than 1,500 kg.

6.21.3.4.10 While demolition is underway, the Engineer may, at any time, request to the **Contractor** that the capacity of the authorized hydraulic hammers be reduced when he considers that the demolition work causes damage to the reinforcing steel or to the concrete to be preserved.

6.21.3.5 The use of a shear concrete breaker is permitted only for the following demolition work:

6.21.3.5.1 demolition of the outer side of a slab on girders up to 300 mm from the edge girders or of the concrete to be preserved;

6.21.3.5.2 demolition of a concrete barrier up to 100 mm from the top of the slab;

6.21.3.5.3 complete demolition of a deck, in which case the characteristics of the equipment used, and the method of demolition shall be specified in the Contractor's demolition plan.

6.21.3.6 The use of pneumatic hammers is subject to the following restrictions, which depend on the elements to be demolished.

6.21.3.6.1 Complete demolition of a slab on girders

6.21.3.6.1.1 For the demolition of the concrete located close to and above the girders and diaphragms, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 30 kg.

6.21.3.6.1.2 For the demolition of the concrete at and under the lower reinforcement layer of the slab located above the girders and diaphragms, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 7 kg.

6.21.3.6.2 For the complete demolition of a curb as well as that of a sidewalk or bicycle path with overlay above the slab, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 30 kg.

6.21.3.6.3 For the demolition of the last 100 mm of a concrete barrier adjacent to the slab, the Contractor shall use a hand-held pneumatic hammer weighing no more than 15 kg.

6.21.3.6.4 Demolition of a deck joint

6.21.3.6.4.1 For the demolition of the joint shoulders and slab adjacent to the joint, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 30 kg.

6.21.3.6.4.2 For the demolition of the concrete at and under the lower reinforcement layer of the slab located above the girders and diaphrams, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 7 kg.

6.21.3.6.4.3 For the demolition of the upper part of the backwall having a thickness of less than 450 mm, the **Contractor** shall use, up to 100 mm from the concrete to be preserved, a hand-held pneumatic hammer weighing no more than 30 kg.

6.21.3.6.4.4 For the final demolition of the backwall up to the concrete to be preserved, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 15 kg.

6.21.3.6.5 For the final demolition of the last 300 mm of a transition slab close to the backwall, the Contractor shall use a hand-held pneumatic hammer weighing no more than 15 kg.

6.21.3.6.6 For the partial demolition of the concrete above the first reinforcement layer, the Contractor shall use a hand-held pneumatic hammer weighing no more than 15 kg for the girders, diaphragms, columns, seat blocks, pier caps and other thin and slender elements.

6.21.3.6.7 For the demolition of the concrete of the bridge elements other than those indicated in paragraph 6.21.3.6.6, the Contractor shall use a hand held pneumatic hammer weighing no more than 30 kg.

6.21.3.6.8 For the demolition of the concrete at and under the first reinforcement layer, the Contractor shall use a hand-held pneumatic hammer weighing no more than 7 kg for the girders, diaphragms, columns, seat blocks, pier caps and other thin and slender elements.

6.21.3.6.9 For the demolition of the concrete at and under the lower reinforcement layer of a slab above the girders and diaphragms, the **Contractor** shall use a hand-held pneumatic hammer weighing no more than 7 kg.

6.21.3.6.10 If the final profile once hydrodemolition is completed does not comply with the limits and dimensions indicated on the drawings, the Contractor shall complete the demolition using a pneumatic hammer until the results required by the Engineer are achieved.

6.21.3.6.11 The tip used on the pneumatic hammers shall be pointed or flat.

6.21.3.6.11.1 The width of the end of the tip shall not exceed the diameter of that tip.

6.21.3.6.12 Demolition is prohibited within 5 m of any recently concreted area where the strength of the concrete is less than 70% of the strength specified at twenty-eight (28) days.

6.21.3.7 For hydrodemolition work, the **Contractor** shall meet the following requirements:

6.21.3.7.1 The Contractor shall submit to the Engineer a detailed methodology. This methodology shall be accepted by the Engineer, failing which the Contractor will not be allowed to proceed with the hydrodemolition work.

6.21.3.7.2 The detailed methodology shall include:

6.21.3.7.2.1 a complete description of the proposed equipment, including the water supply system and high-pressure pumping system, indicating the maximum operating pressure that can be reached;

6.21.3.7.2.2 the description of the method to control the accuracy and uniformity of the work;

6.21.3.7.2.3 a proof of the competence of the hydrodemolition equipment operator;

6.21.3.7.2.4 a list of the replacement equipment that will be available on the worksite;

6.21.3.7.2.5 the equipment planned to control and recover the water and residues.

6.21.3.7.3 The Contractor shall install a system for filtering any water discharged into the river to ensure that the suspended solids do not exceed 25 mg/L. The Contractor shall obtain all required permits and authorizations and shall comply with all applicable legislation to that effect.

6.21.3.7.4 Before the work covered by this section begins, calibration tests shall be conducted in the presence of the Engineer in order to ensure that the equipment, personnel and work methods proposed by the Contractor can produce the required results to the satisfaction of the Engineer. The tests shall be conducted according to the following criteria:

6.21.3.7.4.1 the tests shall cover two (2) areas, each measuring approximately 3 m^2, namely one area of sound concrete and one of deteriorated concrete, to be determined by the Engineer;

6.21.3.7.4.2 the hydrodemolition equipment shall first be calibrated in the test area with sound concrete in order to remove the concrete to a minimum thickness of 10 mm and a maximum thickness equivalent to half the diameter of the coarsest aggregate in the existing concrete;

6.21.3.7.4.3 the hydrodemolition equipment shall subsequently be used in the deteriorated concrete test area using the parameters established in the sound concrete area. If all the deteriorated concrete is removed to the satisfaction of the Engineer, the equipment will be considered calibrated and these parameters will be used for the demolition work. The **Contractor** shall resume the calibration until the results are deemed satisfactory by the Engineer;

6.21.3.7.4.4 the **Contractor** shall bear the costs of these tests. The **Contractor** shall record the test results and parameters obtained in writing and provide copy thereof to the Engineer;

6.21.3.7.4.5 the Engineer reserves the right to refuse the hydrodemolition in the event that the test results do not meet the **Owner**'s requirements.

6.21.4 DEMOLITION SEQUENCES

6.21.4.1 The demolition sequences indicated on the drawings represent the minimum requirements to meet. On-site conditions and the results of the demolition methods used by the **Contractor** may entail the modification of the demolition in order to guarantee the structural integrity of the structure.

6.21.4.1.1 The **Contractor** is solely responsible for establishing the logical sequence of the demolition work and for ensuring the structural integrity of the elements to be demolished and those to be preserved. The demolition methods and sequences shall be submitted to the Engineer for review.

6.21.4.2 The Engineer reserves the right to have the demolition sequences changed at any time during the work if, in his opinion, the structural integrity or stability of the elements concerned is in jeopardy, either because of the condition of the existing elements or because of the demolition and reconstruction methods used by the **Contractor**.

6.21.4.3 Any changes in the demolition sequences resulting from the methods used by the **Contractor** shall be made at no additional cost to the **Owner**.

6.21.4.4 If the **Contractor** wishes to change the demolition sequences required by the Engineer, it shall demonstrate, with supporting design notes, that the structural integrity and stability of the elements of the structure will be maintained at all times. The Engineer may, however, refuse to reduce the demolition sequences indicated on the drawings.

6.21.4.5 The sequences of demolition of the box girders of Section 10 of the Bonaventure Expressway shall meet the following requirements, without however being limited thereto:

6.21.4.5.1 the Contractor may not demolish, whether partially on throughout the thickness, the lower slab of two (2) contiguous cells as long as the repair of the first cell has not been completed and the repair concrete has not reached a compressive strength of 25 MPa.

6.21.4.5.2 the Contractor cannot start the demolition of the outer side of a cell if the repair concrete of the lower slab of this same cell has not reached a compressive capacity of 25 MPa.

6.21.4.6 The **Contractor** shall, prior to proceeding with the demolition of areas that are not indicated on the drawings, notify the Engineer and obtain his authorization.

6.21.5 CONCRETE DEMOLITION

6.21.5.1 PLANNING

6.21.5.1.1 Demolition for rehabilitation work

6.21.5.1.1.1 At least fourteen (14) days prior to the start of demolition, the **Contractor** shall provide a work plan that includes, without however being limited to, the following:

6.21.5.1.1.1.1 the demolition sequences and limits that shall be respected at all times;

6.21.5.1.1.1.2 a complete description of the proposed equipment and tools;

6.21.5.1.1.1.3 an appropriate method to contain the demolition waste or to collect them on a regular basis while the work is being carried out.

6.21.5.1.1.2 The **Contractor** shall provide the access needed to allow the Engineer to delineate the surface areas to be demolished at least forty-eight (48) hours prior to the start of demolition.

6.21.5.1.2 Complete demolition of a deck

6.21.5.1.2.1 At least fourteen (14) days prior to the start of demolition, the **Contractor** shall submit to the Engineer, for review, its demolition plan, signed and sealed by an engineer who is a member of the *Ordre des ingénieurs du Québec* (OIQ). This plan shall include, without however being limited to, the following:

6.21.5.1.2.1.1 the demolition plan shall outline the planned demolition methods, including without however being limited to, the deck demolition method and the uncoupling, by sawing, of the sections to be demolished, if required.

6.21.5.1.2.1.2 the demolition plan shall include drawings and diagrams describing clearly and in detail the order in which the demolition and removal work will be carried out. This order shall not, at any time, compromise the overall stability of the structure.

6.21.5.1.2.1.3 the demolition plan shall include the temporary structures required, without however being limited to, under paragraph 6.21.1.8, including the design notes.

6.21.5.1.2.1.4 the demolition plan shall include the list of equipment and tools, including the specialized equipment, required to carry out the demolition work.

6.21.5.1.2.1.5 the demolition plan shall detail the measures planned to ensure the dust control and the noise control on the worksite, as well as the position of the protective screens (wood panels, debris barrier nets) when indicated on the drawings;

6.21.5.1.2.1.5.1 the measures provided for by the **Contractor** and mentioned in paragraph 6.21.5.1.2.1.5 above shall include, without however being limited to, the implementation of a quality control program in order to demonstrate that the requirements for air pollution and noise pollution are met in accordance with subsection 6.13 *Environmental Protection*;

6.21.5.1.2.1.6 the demolition plan shall detail the means provided for recovering the demolition materials so as to prevent discharge thereof into waterways, on traffic lanes, bicycle paths and sidewalks, in parking lots and on railroad tracks.

6.21.5.1.2.1.7 the demolition plan shall detail the means required indicated in paragraph 6.21.1.10, including the measures implemented for protecting the buildings and facilities located on land adjacent to the demolition work.

6.21.5.1.2.1.7.1 the protective measures shall also include the control of vibrations induced by the demolition work in accordance with subsection 6.13 *Environmental Protection*.

6.21.5.1.2.1.8 the demolition plan shall detail the means provided for ensuring the stability of the existing deck following demolition of the existing bracing and diaphragms, as well as, where applicable, the cutting of the transversal post-tensioning prestressing cables. The **Contractor** shall therefore supply and install all temporary supports, shoring and braces required to ensure the continuity of the strength and stability of the structure as well as an adequate transfer of loads towards the resistant elements and the foundations, and this, at each phase of the demolition work.

6.21.5.2 DELINEATION OF THE AREA TO BE DEMOLISHED

6.21.5.2.1 The main areas where the **Contractor** is required to remove concrete are indicated approximately on the drawings. The Engineer may also instruct the **Contractor** to demolish areas that are not indicated on the drawings.

6.21.5.2.2 Once the concrete surfaces have been sufficiently cleared, to the satisfaction of the Engineer, of any substance that might impede inspection thereof, the Engineer will delineate the surface areas to be demolished using hammer sounding or any other auscultation method chosen by the Engineer and mark them with paint. The **Contractor** shall ensure that the Engineer has the access and time needed to complete this survey.

6.21.5.2.3 The Engineer may, in order to enhance the durability of the repairs, require that some areas be combined, at no additional cost to the Owner, in order to eliminate, amond others, sharp angles, to establish rectilinear edges and simple shapes, or ensure the continuity.

6.21.5.2.4 The demolition may comprise the demolition of sound concrete in order to follow the delineation authorized by the Engineer. The extent of the concrete demolition may thus vary between large regular surface areas covering almost an entire element to small irregular scattered repair areas.

6.21.5.2.5 The minimum demolition depths indicated on the drawings and in the specifications may also require the removal of sound concrete in areas that are congested with reinforcing steel and prestressing cables rendering the concrete demolition more difficult.

6.21.5.2.6 The repair depths are determined by the Engineer based on the types of repairs indicated on the drawings and identified on the worksite.

6.21.5.3 DEMOLITION WORK

6.21.5.3.1 Complete demolition

6.21.5.3.1.1 The expression “complete demolition” applies to a structure that must be completely demolished. It also applies to a bridge element that must be completely reconstructed (deck, slab on girders, deck joint, etc.) and to the outer sides, curbs, barriers, sidewalks and bicycle paths to be reconstructed over their entire section, regardless of the length.

6.21.5.3.1.2 Unless otherwise indicated on the drawings, where the demolition of a structure or deck is to be carried out in phases, that is, a part of the structure is demolished while another part remains open to traffic, the **Contractor** shall uncouple it from the other parts before undertaking the demolition thereof. This uncoupling shall be carried out by means of a concrete saw, a hand held pneumatic hammer weighing no more than 30 kg or a hydraulic hammer whose impact energy per stroke is less than 60 J and which is mounted on a carrier vehicle having a mass less than 1,000 kg.

6.21.5.3.1.3 The **Contractor**’s engineer who signed and sealed the demolition drawings shall be present on worksite during the first work shift during which the demolition of the element covered by a given drawing is carried out. That engineer or another engineer thereby mandated shall be present on worksite for the rest of the demolition of the element covered by these drawings.

6.21.5.3.1.4 The complete demolition of a bridge shall be carried out according to one of the following methods:

6.21.5.3.1.4.1 when the bridge to be demolished interferes with the construction of a new structure, the demolition shall include the footings and upper part of the piles;

6.21.5.3.1.4.2 when the bridge to be demolished does not interfere with the construction, the **Contractor** shall completely demolish the deck and foundation units as follows:

6.21.5.3.1.4.2.1 the abutments, piers and piles shall be demolished up to 1 m below the finished ground level (existing natural ground or riverbed). Where these foundation units are located under the traffic lanes or shoulders of the roadway and that the underside of the footings thereof is located less than 2.5 m under the final road profile, these foundation units and footings thereof shall be completely demolished, while the piles shall be demolished to a depth of 2.5 m relative to the final road profile;

6.21.5.3.1.4.2.2 the **Contractor** shall restore the river's original section according to the upstream and downstream profiles visible beyond the structure to be demolished.

6.21.5.3.1.4.3 when a concrete saw is used for the complete demolition of a deck or slab on girders, the **Contractor** shall visibly locate, on the top of the slab, the position of the girders and diaphragms prior to carrying out the work.

6.21.5.3.1.5 The demolition of the concrete near the girders, diaphragms and foundation units to be preserved shall be carried out using hand held pneumatic hammers meeting the requirements of paragraph 6.21.5.3.2 *Partial Demolition*.

6.21.5.3.1.6 The use of a hydraulic hammer is authorized only if the **Contractor** provides the Engineer with the technical data sheet of the hammer attesting that the technical characteristics thereof meet the requirements.

6.21.5.3.1.7 Using more more than one hydraulic hammer within a 5 m radius is prohibited for the complete demolition of a slab when the girders are to be preserved.

6.21.5.3.2 Partial demolition

6.21.5.3.2.1 No work shall be undertaken before the Engineer has given authorization to proceed.

6.21.5.3.2.2 Unless otherwise indicated on the drawings, the **Contractor** shall make a 20 mm deep saw cut along all demolition limits identified by the Engineer. The **Contractor** shall check the depth of the cuts to make sure the demolition will be to the required depth.

6.21.5.3.2.3 The saw cuts shall be made straight so as to ensure that the work has an aesthetic finish. The cuts shall not intersect at the corners of a repair. The corners shall be delineated by chipping with a pneumatic hammer weighing no more that 7 kg.

6.21.5.3.2.4 If, as the saw cuts are being made, the **Contractor** encounters, at the surface, any reinforcing steel or other elements (such as conduit and pipes) that could be embedded in the concrete, or if there is reason to believe that such elements are present, it shall stop work immediately and notify the Engineer.

6.21.5.3.2.5 The **Contractor** shall take the necessary precautions to ensure that no damage is done to reinforcing steel, conduit, sheaths or, where applicable, prestressing cables.

6.21.5.3.2.6 If the work is impeded by any existing equipment, such as electrical conduit, luminaires or drain pipes, the **Contractor** shall obtain authorization from the Engineer before dismantling such equipment. The **Contractor** shall re-install any dismantled equipment once the work is complete. The **Contractor** shall bear the costs of removing and re-installing such equipment and the costs of providing a temporary power supply, if required.

6.21.5.3.2.7 Once the saw cuts are made, the **Contractor** shall remove the concrete by chipping, as directed by the Engineer and in compliance with the drawings. The **Contractor** shall also slightly bevel inward (at a maximum angle of 45°) the perimeter of all areas where concrete has been removed.

6.21.5.3.2.8 For vertical repairs, the upper face of the demolished surface shall be inclined inward at least 30° relative to the horizontal so as to eliminate high points that might trap air during concreting.

6.21.5.3.2.9 Once the deteriorated concrete has been removed from the final third of the thickness, the pneumatic hammer shall be operated at an angle between 45° and 60° relative to the surface to be demolished.

6.21.5.3.2.10 The **Contractor** shall roughen the surface of areas of non-demolished concrete that are to be concreted in order to obtain a rough and uniform surface.

6.21.5.3.2.11 The demolition of the concrete surfaces of a slab on girder to be repaired shall be carried out as follows:

6.21.5.3.2.11.1 for surface repairs, the surfaces shall be demolished to a minimum depth of 25 mm behind the first reinforcement layer (longitudinal and transversal bars); any unsound concrete encountered beyond that depth shall be removed;

6.21.5.3.2.11.2 for in-depth repairs, the concrete shall be demolished throughout the entire slab thickness when the demolition depth necessary to obtain sound concrete or to clear the reinforcing steel results in the remaining slab thickness being less than 80 mm, or when the concrete of the top of the slab is sound and the concrete underneath the slab is unsound.

6.21.5.3.2.12 The demolition of the concrete of sidewalk or bicycle path surfaces to be repaired with oversize above a slab, a seat or top of the footing of a structure shall be carried out as follows, without however being limited thereto:

6.21.5.3.2.12.1 for surface repairs, the surfaces shall be demolished up to the lesser of the two following values: to a depth of 25 mm behind the first reinforcement layer (longitudinal and transversal bars) or to a depth of 60 mm. Any unsound concrete located beyond these depths shall be removed. Any reinforcing steel that becomes exposed shall be cleared by 25 mm;

6.21.5.3.2.12.2 there is in-depth repair when the demolition depth necessary to obtain sound concrete or to clear the reinforcing steel exceeds 120 mm.

6.21.5.3.2.13 The demolition of the concrete of elements other than those described in paragraphs 6.21.5.3.2.11 and 6.21.5.3.2.12 shall be carried out as follows, without however being limited thereto:

6.21.5.3.2.13.1 the concrete surfaces to be repaired using formworks and oversize, as well as the existing concrete surfaces where new concrete is to be placed shall be demolished to a minimum depth of 10 mm. The concrete located beyond this depth and which disintegrates under the action of water blasting of a pressure of 15 MPa shall be removed. All delaminated concrete shall be removed;

6.21.5.3.2.13.2 the concrete surfaces to be repaired using formworks without oversize shall be demolished to a minimum depth of 100 mm. All unsound concrete located beyond that depth shall be removed. Any reinforcing steel that became exposed shall be cleared by 25 mm.

6.21.5.3.2.14 The **Contractor** shall profile the demolition area in order to facilitate the concrete placement.

6.21.5.3.2.15 If the **Contractor** encounters any deteriorated, disintegrated, crumbled or porous concrete beyond the demolition limits, it shall notify the Engineer.

6.21.5.3.2.15.1 No demolition beyond the demolition limits indicated on the drawings and in the specifications shall be carried out without the authorization of the **Owner**'s design engineer.

6.21.5.3.2.15.2 Following a minimum twenty-four-hour (24) notice, the **Owner**'s design engineer will inspect the condition of the structures, decide whether demolition should continue beyond the demolition limits indicated on the drawings and in the specifications and, where applicable, issue instructions to that effect.

6.21.5.3.2.15.3 When the demolition beyond the demolition limits carried out on instructions from the **Owner**'s design engineer are completed, the design engineer will inspect the demolished areas again within twenty-four (24) hours after having been notified by the **Contractor**.

6.21.5.3.2.16 After having been notified by the **Contractor** that the demolition work is completed, the Engineer will inspect the demolished areas, for acceptance.

6.21.5.3.2.17 The areas demolished beyond the demolition limits indicated on the drawings or beyond the limits authorized by the Engineer or, where applicable, by the **Owner**'s design engineer, will not be measured for payment and shall be repaired by the **Contractor** with the same materials as those used thereby for the repair of concrete in accordance with the instructions from the Engineer, at no additional cost to the **Owner**.

6.21.5.3.2.18 The **Contractor** shall take the appropriate precautions so as not to move or damage the reinforcing steel or reduce its bond with the sound concrete during the concrete demolition work.

6.21.5.3.2.19 When corroded reinforcing steel with section loss is exposed, the **Contractor** shall immediately notify the Engineer thereof, who will provide instructions.

6.21.5.3.2.20 At the request of the Engineer or where required by the specific repair method, the **Contractor** shall continue demolishing the concrete until there is a minimum clearance of 25 mm around the exposed reinforcing steel bar. This bar shall further be cleared over a length of 600 mm at each end of the corroded portion. After the reinforcing steel has been cleaned by means of abrasive blasting, the Engineer will examine the extent of the corrosion of the reinforcing steel and determine whether they need to be replaced.

6.21.5.3.2.21 The **Contractor** shall support, as needed, using concrete anchors and fasteners, any exposed reinforcing steel that is too long to resist deflections, especially during concreting.

6.21.5.3.2.21.1 For large surfaces areas to be repaired, the exposed reinforcing steel shall be fixed to the concrete with anchors placed at a maximum distance of 600 mm on center in both directions.

6.21.5.3.2.21.2 For small surfaces areas to be repaired, a minimum of four (4) anchors shall be installed.

6.21.5.3.2.22 If, owing to a lack of precaution, the reinforcing steel to be preserved is damaged and cannot be reused, the **Contractor** shall replace it, to the satisfaction of the Engineer, at no additional cost to the **Owner**.

6.21.5.3.2.23 The **Contractor** shall, using abrasive blasting followed by brushing, water blasting or any other appropriate method authorized by the Engineer, clean the surfaces to be concreted so as to remove any crumbled concrete, debris, loose particles or contaminants, such as oil, grease and laitance, that may hinder adhesion between the new and the old concrete.

6.21.5.3.2.24 All corroded reinforcing steel exposed during concrete demolition work shall be cleared of any corrosion along with concrete pieces that no longer adhere by wet abrasive blasting, with the exception of exposed sleeves, cables, strands and prestressing wires which shall not be subjected to an abrasive jet preparation but only be cleaned with an air or pressurized water blasting. Reinforcing steel that still has a layer of delaminated rust after it has been cleaned shall be cleaned using scrapers or steel brushes.

6.21.5.3.2.25 Water blasting shall be carried out as follows:

6.21.5.3.2.25.1 a pressure of 15 MPa;

6.21.5.3.2.25.2 a flow of 20 L/min, concentrated circular jet nozzle;

6.21.5.3.2.25.3 a nozzle/concrete surface distance of 150 mm to 200 mm.

6.21.5.3.3 Specific requirements for prestressed concrete girders

6.21.5.3.3.1 For prestressed concrete girders, the **Contractor** shall demolish the damaged concrete of the soffit, lateral faces and girder web according to the following sequences:

6.21.5.3.3.1.1 the **Contractor** shall commence the demolition of a girder by its middle third calculated over the length between the supports thereof;

6.21.5.3.3.1.2 after the complete repair of the central section of the girder (one third of the span), the **Contractor** shall proceed with the repair of the girder ends, one end at a time.

6.21.5.3.3.2 The minimum period between the end of concreting and the start of demolition of the following sequence indicated on the drawings shall be such that the concrete has reached 75% of its strength specified at twenty-eight (28) days.

6.21.5.3.3.3 The saw cuts required to demolish the prestressed concrete girders shall be 10 mm deep as indicated on the drawings.

6.21.5.3.3.4 Any reinforcing steel that shows damage caused by the demolition work, deep pittings or section losses greater than 25% shall be replaced, as directed by the Engineer, at the **Contractor**'s expense.

6.21.5.3.3.5 The areas of the prestressed concrete girder lower footings and webs where the prestressing sheaths, cables, strands and wires are exposed shall not be prepared by means of abrasive blasting and shall be prepared only with water blasting.

6.21.5.3.3.6 The depth of the concrete demolition shall be limited to the concrete thickness covering the prestressing elements. The AASHTO girder strands that were or became exposed by the demolition work shall be not be cleared unless the cover concrete is of poor quality.

6.21.5.3.3.7 Excess clearance of the concrete close to the prestressing elements can lead to a permanent reduction in the capacity thereof. Monitoring of the concrete demolition by a structural engineer, member of the OIQ, employed by the **Contractor** is required. When so requested by the Engineer, a support girder shoring shall be installed at the **Contractor** expense.

6.21.5.3.3.8 The strands shall not be damaged by the demolition work. The saw used to delineate the work and the tip of the pneumatic hammer used for the demolition shall not come into contact with these elements. Damage, even minor, can lead to the strands or cables being severed, and thus permanently reduce the capacity of the element.

6.21.5.3.3.9 The concrete shall be demolished by hydrodemolition or with a hammer weighing no more than 7 kg.

6.21.5.3.3.10 The exposed part of the strands, cables and reinforcing steel shall be cleaned with a wire brush to remove any rust.

6.21.5.3.3.11 The **Contractor** must demolish the concrete with a pneumatic hammer weighing 7 kg or less in the longitudinal direction of the girder in order to avoid damaging the existing prestressing sheaths, cables and wires, notwithstanding any alternative method that could have been used by the **Contractor** during the performance of previous contracts with the **Owner**.

6.21.5.4 CONCRETE ROUGHENING

6.21.5.4.1 The concrete roughening is the operation that consists in partially demolishing the concrete.

6.21.5.4.2 The roughening shall be carried out using a hand held pneumatic hammer weighing no more than 7 kg, water blasting meeting the requirements of paragraph 6.21.5.3.2.25 or by hydrodemolition.

6.21.5.4.3 Unless otherwise indicated on the drawings or in this subsection, the roughening shall be carried out to a minimum depth of 10 mm.

6.21.5.4.4 The concrete located beyond that depth and which disintegrates under the action of water blasting shall be roughened to a maximum depth of 50 mm.

6.21.5.5 INSPECTION OF WORK

6.21.5.5.1 The **Contractor** shall not place any reinforcing steel, concrete, wire mesh or install any formwork before the Engineer has approved the demolished surfaces.

6.21.5.5.2 Unless otherwise indicated on the drawings, the accepted tolerance on demolition work is $\pm$ 25 mm over the length and width of the defined surfaces areas. The tolerance for thickness deviations is a maximum of 10 mm beyond the demolition limits indicated on the drawings or prescribed by the Engineer.

6.21.5.5.3 Any area demolished beyond the prescribed tolerance will not be measured for payment.

6.21.6 UNDERWATER CONCRETE DEMOLITION

6.21.6.1 DELINEATION OF THE AREAS TO BE DEMOLISHED UNDERWATER

6.21.6.1.1 The Contractor shall completely clean the underwater and drawdown surfaces. The surfaces shall be cleared of marine growth, vegetation, mussels and deposits of limestone, and of any other accumulations of materials in order to make it possible for the Contractor's personnel and for the Engineer to confirm the damage indicated on the drawings and to identify any other damage that might not have been found in previous inspections. This cleaning shall be carried out by means of water blasting or any other method that will ensure a degree of cleaning equivalent to that of abrasive blasting.

6.21.6.1.2 The Contractor shall thoroughly examine the surfaces to be repaired in order to detect any deterioration of the concrete (cracks, delamination or other).

6.21.6.1.3 The Contractor shall carefully survey and report on drawings all the deteriorations thereby observed. The following information shall be recorded on the drawings: the dimensions (length, width and depth), orientation and exact location of the deteriorations. Any areas of scouring or raveling shall also be indicated.

6.21.6.1.4 The Contractor shall also videotape the survey of the deteriorations thereby observed.

6.21.6.1.5 The Contractor shall submit its surveys, in the form of drawings, and the video recording to the Engineer prior to the start of demolition work. The Engineer will use the drawings and video recording to validate the equipment, repair methods and materials to be used. At this stage, the Engineer may accept preliminary drawings. The final drawings shall, however, be submitted when the work is completed.

6.21.6.2 UNDERWATER DEMOLITION WORK

6.21.6.2.1 The perimeter of the areas to be repaired shall be delineated with a saw cut or by hydrodemolition so that the concrete can be profiled perpendicular to the surface. A beveled preparation (ending in a zero thickness) is not acceptable.

6.21.6.2.2 The validated areas shall be demolished using pneumatic hammers or high-pressure water blasting. The demolition method shall make it possible to demolish concrete up to 25 mm behind the reinforcing steel.

6.21.6.3 INSPECTION OF UNDERWATER WORK

6.21.6.3.1 The **Contractor** may not undertake the subsequent work as long as the demolished areas have not been approved by the Engineer.

6.21.6.3.2 Unless otherwise indicated on the drawings, the accepted tolerance on underwater demolition work is $\pm$ 40 mm over the length and width of the defined surface areas. The tolerance for thickness deviations is a maximum of 15 mm beyond the demolition limits indicated on the drawings or authorized by the Engineer.

6.21.6.3.3 Any area demolished beyond the prescribed tolerance will not be measured for payment.

6.21.6.3.4 The areas demolished beyond the limits indicated on the drawings or authorized by the Engineer shall be repaired by the Contractor with the same materials as those used thereby for the concrete repair in accordance with the instructions from the Engineer, at no additional cost to the **Owner**.

6.21.7 REMOVAL OF THE ASPHALT PAVEMENT

6.21.7.1 DELINEATION OF THE AREAS TO BE REMOVED

6.21.7.1.1 The Engineer will delineate the areas of existing asphalt pavement that is to be removed by the Contractor.

6.21.7.1.2 No asphalt pavement removal work shall be undertaken before the Engineer has inspected the areas where the pavement is to be removed and given authorization to proceed.

6.21.7.1.3 For a bridge deck, the Contractor shall first check the thickness of the existing asphalt pavement using a drill and concrete drill bits at points located no farther apart than 5 m around the surface perimeter, no farther apart than 10 m longitudinally and, to a minimum, in each traffic lane. The Engineer may require that the thickness be checked at closer spacings.

6.21.7.2 REMOVAL WORK ON BRIDGE DECK

6.21.7.2.1 The Contractor shall make a saw cut along all the demolition limits in accordance with the drawings and shall not damage the deck of the bridge, the viaduct or of any other structure. The saw cuts shall be straight so as to ensure that the work has an aesthetic finish.

6.21.7.2.2 The equipment used to remove the asphalt pavement shall not reduce the reinforcing steel cover, shall not damage the slab or the other elements of the structure and shall be authorized by the Engineer.

6.21.7.2.2.1 The buckets of the hydraulic excavators or backhoes used to strip the pavement must be buckets with blades. Buckets with teeth are prohibited.

6.21.7.2.3 If milling is permitted on the drawings, milling of the asphalt pavement located near the joints shall be carried out by means of the following type of equipment:

6.21.7.2.3.1 equipment that makes it possible to obtain an even milled surface with no deformation, a uniform texture and grooves with a relative depth less than 8 mm;

6.21.7.2.3.2 equipment with an automatic profile control device (allowable error $\pm$ 3 mm). This equipment shall not damage the slab, the top of the prestressed girders, the waterproofing membrane edges located along and underneath the barriers, and the other elements of the structure;

6.21.7.2.3.3 equipment that has a maximum mass of 25 t, excluding the water, without however exceeding the capacity of the bridge, viaduct or structure concerned;

6.21.7.2.3.4 equipment having a mandrel not wider than 1,000 mm;

6.21.7.2.3.5 equipment whose rear conveyor may be removed for milling at the junction of a deck joint and of a curb.

6.21.7.2.4 Hand tools shall be used to remove the asphalt pavement in areas that mechanical equipment cannot reach, such as the concrete shoulders of deck joints, the drains, catch basins and manholes, or in locations where elements on the surface slab could be damaged.

6.21.7.2.5 The Contractor shall take the appropriate action to ensure that the runoff water drainage system is not obstructed by milling or stripping residues. If necessary, the Contractor shall clean the drains at its expense.

6.21.7.2.6 After having removed the asphalt pavement and repaired the deteriorated surfaces, the Contractor shall thoroughly clean the slab surface by means of air blasting in order to remove any traces of waterproofing membrane, asphalt pavement, disaggregated concrete and other debris.

6.21.7.2.7 If the deck waterproofing membrane is to be preserved, the Contractor and the Engineer shall inspect the milled surface to identify and locate the areas where the membrane must be repaired.

6.21.7.2.7.1 The **Contractor** shall repair the membrane in accordance with subsection 6.64 *Deck Waterproofing Membrane.*

6.21.7.3 SPECIFIC REQUIREMENTS FOR THE CHAMPLAIN BRIDGE

6.21.7.3.1 Sections 5 and 7 of the Champlain Bridge

6.21.7.3.1.1 The asphalt pavement removal on the deck of Sections 5 and 7 of the Champlain Bridge shall be removed by stripping only. The **Contractor** shall propose a method, which shall be authorized by the Engineer before the work begins.

6.21.7.3.1.2 The **Contractor** shall submit to the Engineer, for review, the list of the equipment, including the specialized equipment, that it intends to use and which shall allow the safe removal of the asphalt pavement.

6.21.7.3.1.3 The stripping shall not damage the concrete slab or the other elements of the structure.

6.21.7.3.1.4 A bucket without teeth or a bucket with teeth to which a plate has been welded may be used. The bucket shall allow the shear removal of the pavement without damaging the slab concrete.

6.21.7.3.1.5 The equipment used for stripping shall weigh less than 20 t without however exceeding the posted bridge capacity, which corresponds to one (1) two-axle truck.

6.21.7.3.1.6 The use of equipment intended for the correction by milling is prohibited to perform the stripping.

6.21.7.3.1.7 Prior to the stripping, the **Contractor** shall delineate the area to be stripped by means of a saw cut that shall be 20 millimeter-deep without, however, exceeding the thickness of the pavement in place. The longitudinal joint shall be straight.

6.21.7.3.1.8 Once the stripping work completed, the concrete surface shall be free of foreign matter. A bitumen film will however be tolerated in the form of non-measurable traces.

6.21.7.3.1.9 The materials from stripping shall be removed from the bridge deck as the stripping operation progresses.

6.21.7.3.1.10 Any damage caused to the slab or to other elements of the bridge by the stripping work shall be repaired at the **Contractor**'s expense.

6.21.7.3.1.11 The **Contractor** shall clean all the slab concrete surfaces as well as those of the first 75 mm at the base of the curbs, sidewalks, bicycle paths, barriers and deck joints. The cleaning shall be carried out in two (2) steps, namely a basic cleaning and an additional cleaning.

6.21.7.3.1.12 The basic cleaning shall be carried out immediately after the removal of the existing asphalt and, where required, after the removal of the existing waterproofing membrane. It shall be carried out according to the following steps, without however being limited to:

6.21.7.3.1.12.1 the basic cleaning shall be carried out by means of wet abrasive blasting or high-pressure water blasting, so as to remove any laitance, traces of rust on the metal portion of the curbs, embedded debris, curing materials or bituminous residues.

6.21.7.3.1.12.2 the equipment used for the wet abrasive blasting shall be equipped with a filter that removes oil. The filter efficiency shall be demonstrated before using the equipment.

6.21.7.3.1.12.3 the cleaned surfaces shall subsequently be cleared of any debris using water blasting compliant with paragraph 6.21.5.3.2.25.

6.21.7.3.1.13 The additional cleaning shall be carried out within forty-eight (48) hours prior to placing the waterproofing membrane tack coat.

6.21.7.3.1.13.1 All the slab concrete surfaces shall be thoroughly cleaned by means of steel shot blasting mounted on wheeled equipment.

6.21.7.3.1.13.2 The equipment shall be adjusted to have a maximum intensity jet.

6.21.7.3.1.13.3 The slab concrete surfaces shall be dry at the time of cleaning.

6.21.7.3.1.13.4 The cleaning of the surface shall not create a vertical drop between two (2) consecutive passages of the equipment.

6.21.7.3.1.13.5 The surfaces located along the first 75 mm at the base of the curbs, sidewalks, bicycle paths, barriers and deck joints shall be cleaned by means of dry abrasive blasting.

6.21.7.3.1.13.5.1 The use of water blasting or wet abrasive blasting is prohibited.

6.21.7.3.1.13.5.2 The quality of that cleaning shall be at least equivalent to that obtained by steel shot blasting.

6.21.7.3.1.13.6 The concrete surfaces soiled by oily matter shall be cleaned or repaired in surface.

6.21.7.3.1.13.7 Traffic on the slab is prohibited from the beginning of the additional cleaning of the existing slab, with the exception of that of the vehicles required for the waterproofing membrane placement.

6.21.7.3.2 Section 6 of the Champlain Bridge

6.21.7.3.2.1 The **Contractor** shall note that the deck of Section 6 of the Champlain Bridge is an orthotropic deck and that, therefore, the pavement to be removed is located on a steel surface.

6.21.7.3.2.2 The **Contractor** shall, no later than fourteen (14) working days prior to carrying out the work, submit the pavement removal method to the Engineer, for review.

6.21.7.3.2.3 Prior to undertaking the removal work, the **Contractor** shall construct a trial section to validate the anticipated production rates and demonstrate to the Engineer that the equipment and the asphalt pavement removal method are adequate and do not damage the bridge deck.

6.21.7.3.2.4 The **Contractor** shall make the 20 mm deep saw cuts in the asphalt pavement. The **Contractor** shall however reduce that depth when the thickness of the existing pavement is less than 20 mm and make sure not to damage the steel deck.

6.21.7.3.2.5 If the asphalt pavement replacement work is carried out over two (2) weekends for the same span, the **Contractor** shall make a first longitudinal saw cut during the first weekend. During the second weekend, the **Contractor** shall make a second longitudinal saw cut at a distance of 100 mm to 150 mm from the first saw cut (in the new pavement). The **Contractor** shall fully assess the position of the second saw cut so that the cold joint complies with subsection 6.82 *Hot-Mix Pavement*.

6.21.7.3.2.6 The **Contractor** shall remove by milling, in the locations indicated on the drawings, the existing pavement on the steel deck, as well as the existing membrane, if any, as prescribed by this subsection and as directed by the Engineer. The pavement shall be completely removed and the **Contractor** shall take care not to damage the steel deck surface, in particular the weld beads.

6.21.7.3.2.7 The removal of the asphalt pavement on the bridge deck shall be carried out by means of an excavator whose maximum mass is less than 20 t without, however, exceeding the posted bridge capacity. The bucket used by the **Contractor** shall be a bladed bucket in accordance with paragraph 6.21.7.2.2.1. Sandblasting and hydrodemolition could be used under the same conditions as those for the demolition using an excavator. A trial section shall be constructed by the **Contractor** to that effect, as defined in paragraph 6.21.3.7.4.

6.21.7.3.2.8 It is strictly prohibited to use a leveler to remove the asphalt pavement on the deck of section 6 of the bridge.

6.21.7.3.2.9 The use of a rock breaker or of hydraulic hammers of whatever size is not permitted on the deck of section 6 of the bridge.

6.21.7.3.2.10 The **Contractor** shall take the necessary measures to prevent the asphalt residues from entering into the barrier's drains. If residues enter into the barrier's drains, the **Contractor** shall clean the barrier's drains at its expense.

6.21.7.3.2.11 Surface preparation

6.21.7.3.2.11.1 The **Contractor** shall take the necessary measures to prevent damage to the steel deck, weld beads and steel plates during the surface preparation work.

6.21.7.3.2.11.2 The following minimum requirements apply to the preparation of the steel deck surfaces by abrasive blasting:

6.21.7.3.2.11.2.1 unless otherwise indicated on the drawings, the **Contractor** shall carry out the surface preparation work according to standard SSPC-SP10 *Grenaillage presque blanc*.

6.21.7.3.2.11.2.2 the **Contractor** shall perform surface preparation by abrasive blasting or shot blasting. The abrasive used shall be non-quartzose and non-siliceous. The abrasives used shall first be approved by the Engineer. The **Contractor** shall demonstrate, through the construction of a trial section that reproduces the conditions and materials in place, that the method used makes it possible to obtain the preparation compliant with standard SSPC-SP10. This trial section shall be constructed in the presence of the Engineer at least seven (7) days prior to commencing the surface preparation work. The costs related to the preparation, construction and quality control of this trial section shall be borne by the **Contractor**.

6.21.7.3.2.11.3 The profile shall not have irregularities greater than 50 µm.

6.21.7.3.2.11.4 After stripping, the deck surfaces shall be free of foreign matter. A bitumen film will however be tolerated in the form of non-measurable traces. The zinc coating shall not be damaged.

6.21.7.3.2.11.5 The **Contractor** is responsible for disposing of the materials from stripping in accordance with subsection 6.13 *Environmental Protection*.

6.21.7.3.2.11.6 Any damage to the deck, weld beads, steel plates or other bridge elements by the stripping work shall be repaired at the **Contractor**'s expense.

6.21.7.3.2.11.7 When the surface preparation is completed, the deck shall be ready for the application of the zinc primer or for the paving work, as appropriate. The surfaces to be treated with the zinc primer shall be clean. The deposits and residues from the asphalt removal work shall be removed by suitable methods.

6.21.7.4 SPECIFIC REQUIREMENTS FOR THE JACQUES CARTIER AND HONORÉ MERCIER BRIDGES

6.21.7.4.1 Delineation of the areas to be removed

6.21.7.4.1.1 The deck of sections 2 to 8 of the Jacques Cartier Bridge and the deck of sections 1 to 4 of the Honoré Mercier Bridge are protected by a waterproofing membrane. The asphalt removal shall be carried out by stripping only.

6.21.7.4.1.1.1 The asphalt pavement removal shall be carried out so as to maintain a 15 mm protective asphalt pavement layer over the membrane.

6.21.7.4.1.1.2 The theoretical thickness of the asphalt pavement covering the waterproofing membrane shall be 55 mm.

6.21.7.4.1.1.3 The **Contractor** shall note that the thickness of the existing asphalt pavement on the Jacques Cartier and Honoré Mercier Bridges may vary in function of the presence of rutting according to the survey provided in Appendix 6.21-I *Table of the Rutting Survey and Excerpt form the Laboratory Report* of this subsection.

6.21.7.4.2 Test benches

6.21.7.4.2.1 The **Contractor** shall conduct test benches before carrying out the bridge pavement rehabilitation work, in order to validate its working method and have it reviewed by the Engineer. The curing period of the tack coat shall also be submitted to the Engineer, for review, in order to plan the asphalt pavement milling and paving work on the bridge.

6.21.7.4.2.2 The location of the test benches is indicated on the drawings.

6.21.7.4.2.3 The Engineer reserves the right to have additional test benches conducted following the results obtained during the first test benches, at the **Contractor**'s expense.

6.21.7.4.2.4 When conducting a test bench, the **Contractor** shall provide for the milling of the asphalt, placement of the tack coat, where applicable, timely repair of the waterproofing membrane, placement of asphalt mix, placement of a waterproofing strip and pre-marking of the pavement.

6.21.7.4.2.5 The **Contractor** shall provide the Engineer, for review, with the weigh bills of all trucks used to transport the milled asphalt off-site when each test bench is conducted.

6.21.7.4.3 Removal work

6.21.7.4.3.1 The levelers used by the **Contractor,** for the removal work, shall be equipped with an electronic system allowing a controlled milling, in order to comply with the existing slopes and profiles to replicate.

6.21.7.4.3.2 The **Contractor** shall use equipment with a maximum mass of 39.2 t, that is 23 t on the front axle and 16.2 t on the rear axle, excluding water, without however exceeding the capacity of the bridge.

6.21.7.4.3.3 The **Contractor** may use levelers having a width greater than 1 m to carry out the milling on the deck. Using this type of equipment shall be done while meeting the following requirements, without however being limited thereto:

6.21.7.4.3.3.1 using a second leveler in a span when there is a leveler with a width greater than or equal to 1.5 m in this same span is prohibited;

6.21.7.4.3.3.2 using a second leveler in an adjacent span is prohibited;

6.21.7.4.3.3.3 the dump trucks that collect the milling residues of this type of leveler shall never be in the same lane as the leveler. They shall be in adjacent lanes;

6.21.7.4.3.3.4 waiting trucks shall not be on the spans where the milling is being carried out;

6.21.7.4.3.3.5 loaded dump trucks or dump trucks in the process of being loaded shall not circulate in the same lane as the levelers;

6.21.7.4.3.3.6 the total load of the **Contractor**'s vehicles and machinery circulating in a lane of a span shall at no time exceed 67 t;

6.21.7.4.3.3.7 the **Contractor** shall refer to Appendix 6.21-II *Diagram of the Milling Work on the asphalt pavement for the Jacques Cartier Bridge* for the outline of the procedures for the removal work at the Jacques Cartier Bridge.

6.21.7.4.3.4 For the purposes of this subsection, a bridge span is defined as the surface area between two (2) successive expansion joints.

6.21.7.4.3.5 The leveler shall never circulate on the bridge at a speed exceeding 25 km/h.

6.21.7.4.3.6 The distance between the front and the rear axle of the leveler shall not be less than 5.3 m.

6.21.7.4.3.7 In the event of technical or mechanical problems with the leveler, the **Contractor** shall make transition slopes for longitudinal or transverse connections of 2.5% or less in order to reduce the drops.

6.21.7.4.3.8 The **Contractor** shall at no time leave milled surface areas on the bridge when reopening to traffic. The **Contractor** shall implement the asphalt pavement layer before reopening the lanes to traffic.

6.21.7.4.3.9 The **Contractor** shall take the necessary measures so that the milling residues do not settle in the bridge's catch basins, expansion joints or drains. In the cases where they do, the **Contractor** shall proceed with the cleaning these elements at its expense. In addition, the **Contractor** shall make sure not to damage the existing services, such as electricity manholes, Bell's draw wells or any other public utility services, and the **Owner**'s services in the planing area, whether or not indicated on the drawings.

6.21.7.4.3.10 The **Contractor** shall take into account, in its milling work, the rutting survey provided in Appendix 6.21-I *Table of the Rutting Survey and Excerpt form the Laboratory Report* of this subsection as part of the milling work.

6.21.7.4.3.11 Any milled area outside of the work limits indicated on the drawings will not be paid and shall be repaired at the **Contractor**'s expense.

6.21.7.4.3.12 The **Contractor** shall, every day, provide the Engineer with the weigh bills of all trucks used to transport the milled asphalt pavement outside the worksite.

6.21.7.4.3.13 Every 10 m for each longitudinal passage of the leveler, the Engineer reserves the right to take measurements of the thickness of the milled surface. If the Engineer notes any value outside the tolerances indicated on the drawings, the **Contractor** shall adjust the milling thickness before continuing the milling work on another distance of 10 m.

6.21.7.4.3.14 Should the waterproofing membrane be damaged during the milling of the asphalt pavement, it shall be repaired in accordance with subsection 6.64 *Deck Waterproofing Membrane*.

6.21.7.5 REMOVAL WORK ON ROADWAY

6.21.7.5.1 The Contractor shall make a saw cut over the full thickness of the pavement along all demolition limits as indicated on the drawings. The saw cuts shall be straight so as to ensure that the anchoring has an aesthetic finish.

6.21.7.5.2 The Contractor shall be carried out the milling in accordance with the thicknesses to be removed indicated on the drawings.

6.21.7.5.3 When the asphalt pavement on the roadway is to be completely removed, the Contractor shall have the proposed equipment reviewed by the Engineer.

6.21.7.5.4 The demolition of asphalt pavement located close to catch basins and manholes shall be carried out by means of manual equipment.

6.21.7.5.5 The transportation and disposal of asphalt pavement demolition waste shall be carried out in accordance with subsection 6.13 *Environmental Protection.*

6.21.7.6 DEMOLITION OF EXPANSION JOINTS

6.21.7.6.1 At least fourteen (14) days prior to the start of demolition work, the Contractor shall submit to the Engineer the method and equipment it intends to use and the phasing of work that it intends to implement to carry out the demolition of the joint.

6.21.7.6.2 Prior to undertaking the demolition of the joint, including the median and lateral barriers, the Contractor shall dismantle and temporarily support the electrical or optical equipment thereto attached, including the lampposts and junction boxes.

6.21.7.6.3 The Contractor shall delineate the area to be demolished indicated on the drawings with a saw cut.

6.21.7.6.4 For each phase of demolition of the joint, the **Contractor** shall use the equipment prescribed in Article 6.21.3.4.5 of this subsection.

6.21.7.6.5 The **Contractor** shall demolish the concrete and the steel of the existing joint so as to allow the installation of the new joint or carry out the blocking thereof.

6.21.7.6.6 The **Contractor** shall demolish the median barrier and/or the lateral barriers in accordance with the drawings.

6.21.7.6.7 All waste shall be removed from the worksite as soon as possible. If the **Contractor** fails to remove the waste within a reasonable time, the Engineer may decide to have it removed at the **Contractor**'s expense.

6.21.7.6.8 The **Contractor** shall transport and dispose of expansion joint demolition waste in accordance with subsection 6.13 *Environmental Protection*.

6.21.7.6.9 The **Contractor** shall, on a permanent basis and for the entire duration of the work, have a circular concrete saw available on the worksite.

6.21.7.6.10 The **Contractor** shall take special precautions to avoid damaging the prestressing and post-tensioning cables.

6.21.7.6.11 Following the completion of the demolition work, the **Contractor** shall proceed with the sweeping and/or cleaning with water of the concrete surface to allow the inspection of these by the Engineer.

6.21.7.6.12 If traffic must be restored before the completion of the joint replacement work, the **Contractor** shall, before reopening the lanes to traffic, install the temporary safety measures indicated on the drawings.

6.21.7.7 INSPECTION OF WORK

6.21.7.7.1 After having been notified by the **Contractor** that the removal work is completed, the Engineer will inspect the prepared areas in order to assess compliance thereof with the requirements. The Engineer may ask the **Contractor** to remove any residues that, in his opinion, hinder the inspection or are undesirable for the continuation of the work.

6.21.7.7.2 The accepted tolerance is $\pm$ 25 mm over the length and width of the defined surface areas. Any area removed beyond the prescribed tolerance will not be measured for payment and shall be repaired by the **Contractor** at its expense in accordance with the Engineer's instructions.

6.21.8 REMOVAL OF EQUIPMENT AND STRUCTURAL ELEMENTS

6.21.8.1 GENERAL

6.21.8.1.1 The equipment and structural elements that are to be removed permanently will be identified before the work begins. Unless otherwise indicated on the drawings, such equipment and elements shall, once removed, become the property of the Contractor and shall be disposed of in authorized sites.

6.21.8.1.2 The equipment and elements that are to be temporarily removed and re-installed are the Contractor's responsibility during construction, but remain the property of the Owner. Unless otherwise indicated, they shall be properly stored on the worksite during the work period.

6.21.8.2 REMOVAL OF SIGNAGE PANELS

6.21.8.2.1 Overhead signage panels

6.21.8.2.1.1 The overhead signage panels to be removed and recovered are indicated on the drawings.

6.21.8.2.1.2 At least seven (7) days prior to the removal, the **Contractor** shall submit to the Engineer an assembly drawing describing the method recommended for disassembling the existing overhead signage panels. The drawing shall be signed and sealed by an engineer a member of the OIQ.

6.21.8.2.1.3 Fixing the lifting device to the bolts inserted into the top of the panel grooves during the lifting is prohibited.

6.21.8.2.1.4 The **Contractor** shall inform the workers of the existence of the disassembly drawing and of the lifting method.

6.21.8.2.1.5 The authorization to remove the panels shall be obtained from the Engineer prior to undertaking the recovery of the existing superstructure overhead signage panels.

6.21.8.2.1.6 The **Contractor** is responsible for disposing of the waste from the removal of the overhead signage panels in an authorized site in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.2.1.7 The overhead signage panels removed shall be identified and numbered as indicated on the drawings.

6.21.8.2.1.8 The **Contractor** shall, during the removal and transportation of the existing overhead signage panels and the support elements, take the necessary precautions to avoid altering the reflective film and any other component of the panels.

6.21.8.2.1.9 Unless otherwise indicated on the drawings, the **Contractor** shall transport and store the overhead signage panels and their support elements at the **Owner**'s Jacques Cartier Bridge Maintenance Center (Maintenance Center).

6.21.8.2.2 Small signage panels

6.21.8.2.2.1 All small signage panels to be removed and recovered are indicated on the drawings.

6.21.8.2.2.2 The **Contractor** is responsible for disposing of the waste from the removal of the small signage panels in an authorized site in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.2.2.3 The **Contractor** shall, during the removal and transportation of the existing panels, take the necessary precautions to avoid altering the reflective film and any other component of the panels.

6.21.8.2.2.4 The **Contractor** shall transport the small signage panels and support elements thereof at the **Owner**'s Maintenance Centre.

6.21.8.3 REMOVAL AND DISPOSAL OF BARRIERS

6.21.8.3.1 Semi-rigid barriers on wooden posts

6.21.8.3.1.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall remove the semi-rigid barriers on wooden posts, recover the barriers in good condition and dispose of unrecoverable elements off-site.

6.21.8.3.1.2 The **Contractor** shall conduct a survey with the Engineer to determine which barriers to recover and which to dispose of. The **Contractor** shall ensure that the railings recovered are in good condition after delivery thereof to the **Owner**. If railings are damaged during the removal or delivery due to the **Contractor**'s negligence, they shall be replaced with new railings, at the **Contractor**'s expense.

6.21.8.3.1.3 The recoverable metal components (steel sections, tapered ends, round ends) shall be transported and stored at the Maintenance Centre.

6.21.8.3.1.4 The **Contractor** shall take the necessary precautions to avoid damaging the recoverable elements. The use of a torch for cutting bolts or to heat the part to facilitate loosening thereof is prohibited when an element is to be recovered. The unrecoverable metal components and wooden posts shall be transported to authorized sites in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.3.2 Precast concrete barriers with or without an anti-glare screen

6.21.8.3.2.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall remove the precast concrete barriers whether or not an anti-glare screen is mounted thereon.

6.21.8.3.2.2 The precast concrete barrier sections shall be transported and stored at the Maintenance Centre.

6.21.8.3.2.3 If recoverable elements are damaged during the removal or delivery, they shall be replaced with new elements, at the **Contractor**'s expense.

6.21.8.4 REMOVAL AND DISPOSAL OF CONCRETE CATCH BASINS AND MANHOLES

6.21.8.4.1 Where indicated on the drawings and/or by the Engineer, the Contractor shall remove and dispose of the concrete catch basins and manholes.

6.21.8.4.2 The catch basin removal includes the removal of the connecting pipe or the protection of the connecting pipe, as indicated on the drawings.

6.21.8.4.3 The manhole removal includes the removal of the valve, as indicated on the drawings.

6.21.8.4.4 The Contractor shall seal, with a waterproof concrete plug, the sewer line that remains functional, into which the removed catch basin or manhole connecting pipe was connected.

6.21.8.4.5 The Contractor shall dispose of the demolition waste in authorized sites in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.5 REMOVAL AND DISPOSAL OF A SPLASH SHIELD

6.21.8.5.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall remove and dispose of a metal splash shield located on the median concrete barrier.

6.21.8.5.2 The **Contractor** shall remove the wire mesh, tips, caps, posts and pedestals and dispose thereof in accordance with subsection 6.13 *Environmental Protection.*

6.21.8.5.3 If required, the **Contractor** shall proceed by sawing to remove the steel posts.

6.21.8.6 DEMOLITION OF CONCRETE ELEMENTS

6.21.8.6.1 Concrete curbs

6.21.8.6.1.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall demolish and dispose of the concrete curbs. The curbs may be of all types (dropped, levelled, raised, etc.).

6.21.8.6.1.2 In the locations where the existing curb is preserved, the **Contractor** shall make a saw cut in order not to damage the curb to be preserved.

6.21.8.6.2 Concrete protection coating

6.21.8.6.2.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall demolish and dispose of the existing concrete protection coating.

6.21.8.6.2.2 The protection coating to demolish has a thickness varying between 100 mm and 200 mm. The **Contractor** shall note the possibility that wire mesh or steel bars may be present in the concrete protection coating.

6.21.8.6.3 Concrete bull noses

6.21.8.6.3.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall demolish and dispose of the existing concrete bull noses.

6.21.8.6.3.2 The **Contractor** shall note that the concrete bull noses to demolish have radii of 0.5 m to 1 m. Wire mesh or steel bars are present in the concrete.

6.21.8.6.4 Concrete gutters

6.21.8.6.4.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall demolish and dispose of the existing concrete gutters.

6.21.8.6.4.2 The **Contractor** shall note that the gutters to demolish have an approximate width of 750 mm and an approximate thickness of 300 mm.

6.21.8.6.5 Concrete lateral barriers

6.21.8.6.5.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall demolish and dispose of the existing reinforced concrete lateral barriers.

6.21.8.6.5.2 The **Contractor** shall note that the lateral barriers to demolish have a width at the base of 350 mm 450 mm.

6.21.8.6.5.3 At the limits of the demolition area, the **Contractor** shall make a saw cut in order to avoid damaging the barriers to be preserved.

6.21.8.6.6 Concrete median barriers

6.21.8.6.6.1 Where indicated on the drawings and/or by the Engineer, the **Contractor** shall demolish and dispose of the existing reinforced concrete median barriers.

6.21.8.6.6.2 The median barriers to demolish have a width at the base varying between 600 mm and 750 mm.

6.21.8.6.6.3 At the limits of the demolition area, the **Contractor** shall make a saw cut in order to avoid damaging barriers to be preserved.

6.21.8.6.7 Concrete bases for lamp posts

6.21.8.6.7.1 The **Contractor** shall remove the concrete bases for lamp posts indicated on the drawings or by the Engineer. To do so, the **Contractor** shall completely dig up the concrete base, cut the conduit, remove the concrete base and backfill the cavity.

6.21.8.6.7.2 The **Contractor** shall subsequently dispose of the concrete bases in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.7 REMOVAL AND DISPOSAL OF STORM SEWERS

6.21.8.7.1 The Contractor shall take the necessary measures to ensure that the pipe to be removed is no longer in operation. Before the removal of a pipe in operation, the Contractor shall also submit a request to the Engineer for review.

6.21.8.7.2 At the locations indicated on the drawings and/or authorized by the Engineer, the Contractor shall remove the existing reinforced concrete storm sewers.

6.21.8.7.3 The Contractor shall note that the reinforced concrete storm sewer pipes have a diameter ranging between 250 mm and 900 mm.

6.21.8.7.4 The storm sewer pipes shall be extracted from the ground in accordance with the Contractor's construction sequences, the constraints of carrying out the storm sewer pipe removal work and as the sewer system becomes operational.

6.21.8.7.5 The Contractor shall dispose of any storm sewer debris and sections off-site in accordance with subsection 6.13 Environmental Protection.

6.21.8.7.6 During the removal of storm sewers and the backfilling of excavations, the Contractor shall anticipate that temporary support, cofferdams and water monitoring may be required to dry the bottom of the excavations.

6.21.8.8 STORM SEWERS TO BE ABANDONED AND FILLED WITH CONCRETE

6.21.8.8.1 The **Contractor** shall take the necessary measures to ensure that the storm sewer is no longer in operation. Before proceeding with the abandonment of an existing storm sewer that is in operation, the **Contractor** shall make a request to the Engineer for review.

6.21.8.8.2 Where indicated on the drawings and/or by the Engineer, the Contractor shall fill the existing pipes to be abandoned with self-consolidating concrete with a minimum strength of 15 MPa.

6.21.8.8.3 The filling of the storm sewer to be abandoned shall be carried out in the presence of the Engineer and the method used shall allow the purge of the air present inside the pipe and the measurement the volume of injected concrete. The volume of injected concrete shall be sufficient to completely fill the storm sewer.

6.21.8.8.4 Where applicable, the Contractor shall seal, with a waterproof concrete plug, the storm sewer manhole or manhole-catch basin into which the abandoned storm sewer was connected, in order to avoid filling a manhole to be preserved.

6.21.8.8.5 At the manholes present on the routing of the storm sewer to be abandoned, the Contractor shall remove the frame and cover of the existing manhole as well as the concrete sections, so that the top of the manhole is located at 1 m under the finished ground level or projected subgrade. The Contractor shall subsequently backfill above the abandoned manhole once the concrete has reached a strength of 15 Mpa.

6.21.8.8.6 In the event that the Contractor fills storm sewers, manholes or catch basins to be preserved with concrete, the **Contractor** shall replace such elements at its expense and ensure the pumping of water until the sewer system is corrected.

6.21.8.9 REMOVAL AND DISPOSAL OF A STEEL CHAIN LINK FENCE

6.21.8.9.1 Where indicated on the drawings and/or by the Engineer, the Contractor shall remove the existing steel chain link fences.

6.21.8.9.2 The Contractor shall consider that the height of the existing fences varies between 1.2 m and 1.8 m; that the posts are spaced every 2 m c/c and that they were concreted into the ground to a depth of 1.2 m.

6.21.8.9.3 The removal of the fence shall also include the removal of the existing barriers.

6.21.8.9.4 The Contractor shall dismantle the chain link, the upper and lower railings and the tensioning wires.

6.21.8.9.5 The Contractor shall remove the posts, including the anchoring concrete.

6.21.8.9.6 The Contractor shall backfill the holes with MG 20 granular material.

6.21.8.9.7 The Contractor shall transport and dispose of the demolition waste in an authorized site in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.10 REMOVAL AND RECOVERY OF LAMP POSTS

6.21.8.10.1 The Contractor shall recover every lamp post in an orderly manner. The Contractor shall dismantle in such a manner as to recuperate and preserve the various equipement that make it up such as the safety housing, pole, bracket and the luminaire.

6.21.8.10.2 The Contractor shall place each luminaire recovered in an individual box and write, on the box, the following information: type of luminaire, power, voltage, type of lamp and date of removal.

6.21.8.10.3 The poles and brackets shall be attached in homogeneous groups of six (6) units. The safety housings and luminaires shall be placed on wooden delivery pallets.

6.21.8.10.4 The lamp posts indicated on the drawings shall be transported to the Maintenance Centre. The Contractor shall notify the Engineer forty-eight (48) hours in advance the Engineer and the latter will make the arrangements with the Owner for the deliveries. The recovered elements shall be properly placed in the storage area, to the Owner's satisfaction.

6.21.8.10.5 The Contractor shall remove the pole return conductors and remove the underground conduit distribution conductors. The conductors shall be removed up to the distribution panel. The existing conduit that do not come into conflict with the new facilities shall be abandoned.

6.21.8.10.6 The conductors and other components of the electrical connection of the lamp posts become the property of the Contractor and the latter shall dispose thereof in authorized sites in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.11 DISMANTLING OF OVERHEAD AND LATERAL SIGNAGE STRUCTURES, LANE SIGNAL STRUCTURES AND LANE CONTROL SIGNAL STRUCTURES

6.21.8.11.1 The **Contractor** shall dismantle the existing overhead or lateral signage structures, lane signal structures and lane control signal structures indicated on the drawings.

6.21.8.11.2 Before undertaking the dismantling of a superstructure, the **Contractor** shall conduct an inspection of the structure and notify the Engineer of any existing damage.

6.21.8.11.3 The **Contractor** shall dismantle all elements of the existing overhead supersignage structure, including the vertical and horizontal supports and all elements thereto related.

6.21.8.11.4 The **Contractor** shall take the necessary measures to avoid altering the elements of the overhead signage superstructure. If elements to be recovered are rendered unusable or are damaged during the removal work, they shall be replaced at the **Contractor**'s expense.

6.21.8.11.5 The **Contractor** shall transport and store all the structures back to the Maintenance Centre.

6.21.8.11.6 The **Contractor** shall dispose of all dismantled elements that are not recovered in accordance with subsection 6.13 *Environmental Protection.*

6.21.8.12 LEVELING OF FOUNDATION BLOCKS OF OVERHEAD AND LATERAL SIGNAGE STRUCTURES, LANE SIGNAL STRUCTURES, LANE CONTROL SIGNAL STRUCTURES AND LAMP POSTS

6.21.8.12.1 The **Contractor** shall level the existing signage superstructure or lane signal structure concrete foundation blocks indicated on the drawings, and as directed by the Engineer.

6.21.8.12.2 When the foundation blocks to be demolished do not impede the construction of the structures covered by this Contract, the Contractor shall demolish the foundation blocks up to 1 m below the finished ground level (existing natural ground).

6.21.8.12.3 The Contractor shall dispose of the debris resulting from the demolition work in accordance with subsection 6.13 *Environmental Protection*.

6.21.8.13 DEMOLITION OF FOUNDATION BLOCKS OF OVERHEAD AND LATERAL SIGNAGE STRUCTURES, LANE SIGNAL STRUCTURES, LANE CONTROL SIGNAL STRUCTURES AND LAMP POSTS

6.21.8.13.1 The Contractor shall demolish the existing foundation blocks indicated on the drawings, and as directed by the Engineer.

6.21.8.13.2 In the case where these foundation blocks are located under the traffic lanes or shoulders of the proposed roadway and where the underside of the footings are located within 2.5 m of the final roadway profile, these foundation blocks and their footings shall be completely demolished. When the foundation blocks to demolish impede the construction of a new structure, the demolition shall include the entire foundation block units.

6.21.8.13.3 The **Contractor** shall dispose of the debris resulting from the demolition work in accordance with subsection 6.13 *Environmental Protection.*

6.21.8.14 REMOVAL OF ELECTRICAL EQUIPMENT

6.21.8.14.1 The Contractor shall remove the conduit, cables, junction boxes, pull boxes, supports and accessories that are no longer required in accordance with the indications on the drawings.

6.21.8.14.2 The Contractor shall remove the electrical equipment indicated, taking the necessary precautions to prevent damage to the support on which they are fixed.

6.21.8.14.3 The **Contractor** shall dispose of the electrical equipment removed in accordance with subsection 6.13 *Environmental Protection.*

END OF SUBSECTION