

TENDER DOCUMENTS

SUBSECTION 6.61 BRIDGE JACKING

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SUBSECTION 6.61 BRIDGE JACKING

6.61.1 GENERAL

- 6.61.1.1 This subsection sets out the requirements related to bridge jacking of spans prescribed in this Contract.
- 6.61.1.2 Any specific requirements related to bridge jacking prescribed in this Contract are set out in Section 4 *Special Technical Conditions*.
- 6.61.1.3 The requirements related to the replacement of supports are set out in subsection 6.62 *Bridge bearings*.

6.61.2 REFERENCE STANDARDS

- 6.61.2.1 The **Contractor** shall perform all bridge jacking in accordance with the requirements of the following standards and documents to which the provisions of the Contract are added:

6.61.2.1.1 (CSA) Canadian Standards Association

- CAN/CSA-A23.1-04/A23.2-04 *Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete*;
- CAN/CSA A23.3-04 *Design of Concrete Structures*;
- CAN/CSA G40.20-04/G40.21-04 *General Requirements for Rolled or Welded Structural Steel/Structural Steel*;
- CAN/CSA-G164-M92 (R2003) *Hot Dip Galvanizing of Irregularly Shaped Articles*;
- CAN/CSA S6-06 *Canadian Highway Bridge Design Code*.

6.61.2.1.2 (MTQ) Ministère des Transports du Québec

- MTQ – *Cahier des charges et devis généraux (CCDG)*.

6.61.3 MATERIALS

6.61.3.1 JACKING SYSTEM

- 6.61.3.1.1 Spans shall be jacked using a jacking system.
- 6.61.3.1.2 Some components of the jacking system may be supplied by the **Owner**. Any such components are described on the drawings and in the *Special Technical Conditions*.

6.61.3.2 TEMPORARY SUPPORTS

- 6.61.3.2.1 The shims, cribs and saddles that make up the temporary supports shall be fabricated from galvanized steel.
- 6.61.3.2.2 The shims may be of various specific thicknesses or bevelled depending on the **Contractor's** jacking method and the condition of the underlying and adjacent surfaces.

6.61.4 EQUIPMENT AND TOOLS

- 6.61.4.1 The capacity of the equipment and tools used (such as hydraulic pumps, jacks and valves) shall be such that no more than 75% of their nominal capacity is used.
- 6.61.4.2 The hydraulic system shall be equipped with check valves to ensure uniform, constant pressure on each of the jacks used for the jacking operation.

6.61.5 DESIGN

- 6.61.5.1 The **Contractor** shall submit the detailed method proposed for bridge jacking to the Engineer for review and comments at least fourteen (14) days prior to the date on which bridge jacking is scheduled.
- 6.61.5.2 The **Contractor's** engineer/designer who designs the jacking system shall be an engineer who is a member of or is licensed by the OIQ and has more than ten (10) years of experience in structural work and other similar work. The **Contractor** shall replace any engineer/designer who, in the opinion of the Engineer, does not meet these requirements.
- 6.61.5.3 The **Contractor** is responsible for the design of the jacking method, which includes verifying the capacity of the existing structural elements if they are used to transfer loads or if they necessitate changes of position made necessary by the jacking system and temporary supports.
- 6.61.5.4 The **Contractor** shall consider at least the following elements: the permanent load, traffic live loads, wind, dynamic effects, expansion and any other load indicated on the drawings, the dimensions and current condition of the existing elements, and the grade of the spans at the jacking point.
- 6.61.5.5 The **Contractor** shall also consider in the design of the jacking method the possibility that the surface on which the jacking system rests may not be horizontal.
- 6.61.5.6 The **Contractor** shall produce a detailed drawing of the spans jacking method, including the following dimensions and design notes:
 - 6.61.5.6.1 the jacking system

- 6.61.5.6.2 the span jacking equipment, including jacks and pumps;
- 6.61.5.6.3 the load distribution plates;
- 6.61.5.6.4 any other elements (such as spacers, grout and mortar) required for jacking the bridge;
- 6.61.5.6.5 the method of securing the temporary supports.
- 6.61.5.7 The drawings of the jacking system components provided by the **Owner** are attached to these specifications for information. The **Contractor** shall check the actual dimensions of the various components of the jacking system before starting work.
- 6.61.5.8 The detailed drawings of the jacking method submitted by the **Contractor** shall refer to the drawings of the components of the jacking system supplied by the **Owner**, and the **Contractor's** engineer/designer shall complete or amend them if he considers such action necessary.

6.61.6 EXECUTION

6.61.6.1 PLANNING

- 6.61.6.1.1 At least fourteen (14) days prior to the date for which bridge jacking is scheduled, the **Contractor** shall submit to the Engineer for review and comments drawings of and design notes on the temporary access facilities and technical data sheets for all items used in constructing them, all in conformity to subsection 6.15 *Scaffolding, Platforms and Other Temporary Devices*.
- 6.61.6.1.2 Temporary access facilities shall permit simultaneous continuous access to all jacking points in order to ensure effective coordination of the jacking operation and allow the Engineer to access any jacking point at any time.
- 6.61.6.1.3 The **Contractor** shall provide all the labour, temporary access facilities, specialized tools, equipment and jacking systems, other than any components supplied by the **Owner**, required for the jacking operation.
- 6.61.6.1.4 The **Contractor** shall notify the Engineer seven (7) days prior to the date for which the jacking of spans is scheduled.
- 6.61.6.1.5 The jacking of spans shall be carried out under the responsibility and authority of the **Contractor's** engineer/designer, who shall:
 - 6.61.6.1.5.1 check the condition of any equipment supplied by the **Owner**;

- 6.61.6.1.5.1.1 it is expected that specific inspections of the condition of the components of the jacking system supplied by the **Owner** will be carried out by the **Owner** before the work is carried out by the **Contractor**; the **Contractor** may consult the inspection reports on request;
- 6.61.6.1.5.1.2 notwithstanding the above, the **Owner** shall not be liable in any way regarding the jacking system components and other items supplied; the **Contractor** is responsible for the jacking system and components supplied to it and shall carry out at its own expense such additional inspections thereof as it deems necessary prior to the start of work;
- 6.61.6.1.5.1.3 the **Contractor** shall pre-assemble the jacking system on the ground before it is erected on the structure;
- 6.61.6.1.5.2 ensure that the fabrication and installation of any jacking system and all components used for jacking conform to the drawings and the method proposed and reviewed by the Engineer;
- 6.61.6.1.5.3 establish for each structural component to be raised a method of monitoring the level change between the top of the seat and the bearing point of the structural component to be raised.
- 6.61.6.1.6 Jacking shall not begin until all the new components and bridge bearings to be installed have been delivered to the work site and the related steel or concrete work required for jacking is complete. The span shall be supported by temporary supports for the shortest possible time.
- 6.61.6.1.7 The **Contractor**'s engineer/designer shall conduct an inspection of the jacking system with the Engineer present and shall provide the Engineer with written certification of the conformity of the jacking system installation and other components required for span jacking.
- 6.61.6.1.8 Prior to each jacking operation or placement of spans, the **Contractor** shall hold a coordination meeting with the Engineer and the **Contractor**'s engineer/designer present to ensure that all of the employees and other parties involved in the operation understand the jacking method.
- 6.61.6.1.9 Throughout the jacking operation, the **Contractor**'s engineer/designer shall ensure that the jacking method is applied safely and the integrity of the bridge is not compromised by on-site improvisations.
- 6.61.6.1.10 Span jacking and placement shall be supervised by the **Contractor**'s engineer/designer, who shall be on site throughout the jacking of the spans and placement operations.
- 6.61.6.1.11 Failure by the **Contractor** to comply with the requirements set out in any of paragraphs 6.61.6.1.7 to 6.61.6.1.10 will result in the application of article 5.35.12 *Damages for failure to comply with requirements related to jacking operations.*

6.61.6.2 JACKING OPERATION

- 6.61.6.2.1 Unless otherwise indicated in the *Special Technical Conditions*, jacking shall be carried out evenly in increments not exceeding 1.5 mm, and the jacking height shall be checked for each structural component being raised (beam, truss, etc.) before the next increment proceeds. Further, the structural components of the bridge (such as joints, concrete barriers, guardrails and steel structures) located near the jacking point shall be inspected continuously so as to ensure that excessive stress does not cause any damage.
- 6.61.6.2.2 To provide temporary support and in case a jack breaks, steel temporary supports shall be installed at the appropriate locations in order to carry the loads safely. Their position shall not interfere with the planned position of the new bridge bearings or new components to be installed or hinder any work to be performed during the period between jacking and span placement.
- 6.61.6.2.3 Throughout the jacking operation, all jacks shall be connected to the hydraulic system in order to keep the pressure the same on each one.
- 6.61.6.2.4 Hydraulic pressures shall be monitored continuously in order to ensure that the pressure levels established for jacking by the **Contractor's** engineer/designer are not exceeded.
- 6.61.6.2.5 During the jacking operation, the **Contractor** shall ensure that none of the loaded components of the jacking system develop cracks or become deformed. If cracking or deformation occurs, work shall be stopped immediately. The **Contractor** shall notify the Engineer immediately, and the affected components shall be repaired and reinforced as directed by the **Contractor's** engineer/designer, subject to approval by the Engineer.
- 6.61.6.2.6 Throughout the work period and especially during the jacking operation, the **Contractor** shall ensure that none of the loaded components of the structure develop cracks or become deformed. If cracking or deformation occurs, work shall be stopped immediately. The **Contractor** shall notify the Engineer immediately, and the affected components shall be repaired as directed by the Engineer.
- 6.61.6.2.7 Spacers shall be added to adjust the height of the temporary supports as each component is raised. The thickness of the spacers shall be such that the distance between the top of the temporary support and the bottom of the component being raised is never greater than 1.5 mm.
- 6.61.6.2.8 When the height indicated on the drawings is reached, the temporary supports shall be secured before the load is removed from the jack in order to prevent any possible movement (lateral movement or twisting). The method of securing the supports shall be approved by the **Contractor's** engineer/designer.

- 6.61.6.2.9 Existing bridge bearings may not be replaced or new components installed unless the **Contractor's** engineer/designer has received written authorization from the Engineer.
- 6.61.6.2.10 The placement of raised components shall be carried out using the same method as the one used for jacking.
- 6.61.6.2.11 The jacking system and temporary support system shall not be dismantled until the Engineer has accepted the work and his or her written authorization has been received.
- 6.61.6.2.12 Once the work is done, the **Contractor** shall return to the **Owner**, at a place determined by the Engineer, all components of the jacking system and other components used to raise the spans supplied by the **Owner**.

END OF SUBSECTION