OPSS 904, January 1995, Construction Specification for Concrete Structures, is amended as follows:

904.02 REFERENCES

Section 904.02 of OPSS 904 is amended by the addition of the following reference:

Ministry of Transportations Publications:

Designated Sources for Materials (DSM)

904.03 DEFINITIONS

Section 904.03 of OPSS 904 is amended by the addition of the following definitions:

Dowel: means a reinforcing steel bar, coated reinforcing steel bar, and reinforcing stainless steel bar placed into a hole of specified dimensions drilled into a concrete structure, and bonded to the concrete by epoxy adhesive.

Dowel Type: means a dowel differentiated by reinforcing bar size and by reinforcing bar material, such as 15M reinforcing stainless steel bar and 20M reinforcing steel bar.

Epoxy Adhesive: means a two-component system consisting of resin and hardener used for the bonding of dowels to concrete.

Pull-Test: means an in-situ test performed by the Contractor consisting of the application of a specified tensile axial load for a specified time period to installed dowels selected for testing.

Pull-Test Equipment: means the integrated assembly, including a hydraulic jack with shims to react against the concrete surface adjacent to the dowel and mechanical jaws to grip the dowel, capable of applying the specified tensile loads to the dowels.

904.04 SUBMISSIONS AND DESIGN REQUIREMENTS

904.04.02 Submissions

Subsection 904.04.02 of OPSS 904 is amended by the addition of the following clauses:

904.04.02.14 Epoxy Adhesive Product Data

At least one week prior to the trial installation of a dowel type, the Contractor shall submit the product data sheets and specifications for the epoxy adhesive to be used for that dowel type to the Contract Administrator.

The following shall be included:

a) Name, address, and telephone number for the manufacturer and supplier of the epoxy adhesive;
b) Detailed mixing and placement procedures, including hole preparation;
c) Allowable temperature range, ambient and concrete, for installation of the epoxy adhesive;
d) Curing time to obtain full capacity of the dowel.

In addition, for each dowel type in the Contract the Contractor shall identify any and all locations where the hole diameter and embedment as recommended by the epoxy adhesive manufacturer is different from that specified in the Contract drawings.

904.04.02.15 Pull-Test Equipment Certificate of Calibration

At least one week prior to the trial installation of a dowel type, the Contractor shall submit a certificate of calibration for the pull-test equipment to the Contract Administrator. The certificate of calibration shall be issued by an independent laboratory and include calibration test data not more than 12 months old that defines the relationship between the hydraulic oil pressure in the pull-test jack and the tensile force applied to the dowel.

Devices such as load cells and compression machines used to calibrate the pull-test equipment shall be fully traceable to national standards.

904.04.02.16 Pull-Test Reports

Immediately following the pull-test for a dowel trial installation and the pull-tests for each lot of dowels, the Contractor shall submit a completed test report signed by the testing technician to the Contract Administrator. The test report shall identify the Contract Number, structure name, dowel type and location, applied pull-test loads and times, and amount of displacement.

904.05 MATERIALS

Section 904.05 of OPSS 904 is amended by the addition of the following subsections:

904.05.17 Epoxy Adhesive

The epoxy adhesive shall be a product found in listing 9.10.25 in the Ministry of Transportation’s Designated Sources for Materials.

904.05.18 Dowels

Dowels shall be as specified in the Contract Documents.

904.07 CONSTRUCTION

Subsection 904.07.10 of OPSS 904 is deleted and replaced with the following:

904.07.10 Dowels into Concrete

904.07.10.01 Installation

The Contractor shall drill holes to the required dimensions, place epoxy adhesive and properly position the dowels as specified in the Contract Documents.
Steel reinforcement and other existing embedments shall not be cut or damaged by the drilling process. The Contractor shall notify the Contract Administrator immediately of any potential conflicts with embedments such as existing steel reinforcement, utility ducts and post tensioning hardware.

The Contractor shall notify the Contract Administrator if the concrete in the vicinity of the dowel locations is cracked, delaminated or otherwise not structurally sound prior to drilling the holes.

Core drilling of the dowel holes will not be permitted.

Holes that are started but not completed shall be cleaned and filled with a proprietary product acceptable to the Ministry.

The Contractor’s operations shall not cause spalling, cracking or other damage to the surrounding concrete. Concrete spalled or otherwise damaged by the Contractor’s operations shall be repaired in a manner acceptable to the Contract Administrator.

The holes shall be cleaned using compressed air to remove all deleterious material including dust, debris and water prior to placing the epoxy adhesive.

The handling and placement of the epoxy adhesive shall conform to the manufacturer’s written instructions. All excess epoxy adhesive shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.

Dowels shall be clean and free of deleterious material.

The Contractor shall maintain dowels within the specified dimensions during the setting of the epoxy adhesive and shall prevent the loss of epoxy adhesive from the holes.

All debris resulting from the operation shall be disposed of as specified in the Contract documents.

904.07.10.02 Trial Installation

Prior to installing each dowel type specified in the Contract Documents, the Contractor shall perform a trial installation of that dowel type at locations selected by the Contract Administrator.

Each trial installation shall consist of a set of three dowels. Unless otherwise specified in the Contract Documents, the location of the trial installations will correspond to locations of dowels shown in the Contract Drawings as part of the work.

The Contractor shall conduct pull-tests on the trial installations in the presence of the Contract Administrator. Each of the three dowels in a set must be capable of achieving the test load and times specified in this special provision, without any movement of the dowels, for the trial installation to be considered acceptable.

If the trial installation is not acceptable, the Contractor will not be permitted to install that dowel type in the work until all the following have been carried out to the satisfaction of the Contract Administrator:

a) the Contractor has submitted a written explanation for the failure,
b) the Contractor has identified corrective action to be taken,
c) the Contractor has repeated the trial installation with acceptable results.
904.07.10.03  Pull-Test Procedure

All pull-tests must be performed by the personnel from the laboratory that issued the certificate of calibration for the pull-test equipment. All pull-tests shall be conducted in the presence of the Contract Administrator.

The Contractor shall not install formwork or attach anything to the dowels such as reinforcing bars and utility ducts until the pull-tests have been completed and the dowels are accepted into the work.

904.07.10.04  Pull-Test Loads and Duration

Pull-test loads shall be as shown in Table 1 below.

<table>
<thead>
<tr>
<th>Dowel Size</th>
<th>Test Loads (kN)</th>
<th>Embedment depth less than 200mm</th>
<th>Embedment depth 200mm or greater</th>
</tr>
</thead>
<tbody>
<tr>
<td>10M</td>
<td>20</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>15M</td>
<td>40</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>20M</td>
<td>60</td>
<td></td>
<td>110</td>
</tr>
<tr>
<td>25M</td>
<td>100</td>
<td></td>
<td>180</td>
</tr>
<tr>
<td>30M</td>
<td>140</td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>35M</td>
<td>190</td>
<td></td>
<td>340</td>
</tr>
</tbody>
</table>

The applicable pull-test load must be sustained by the dowel without displacement for a time period of not less than one minute.

904.07.10.05  Access to Work Areas, Work Platform and Scaffolding

Access shall be provided to the Contract Administrator to facilitate the inspection and verification of dowel installations, and witnessing of pull-tests.

904.07.10.06  Changes to Dowel Installation Procedure

If the Contractor changes the installation procedure for a dowel type from that used in the associated trial installation, the Contractor shall repeat the trial installation as specified in this Special Provision prior to incorporating dowels installed using the changed installation procedure into the work.

904.08  QUALITY ASSURANCE

Section 904.08 of OPSS 904 is amended by the addition of the following subsection:
904.08.05    Dowels into Concrete

904.08.05.01    General

Acceptance of dowels into concrete will be based on the pull-test as specified in section 904.07 of this Special Provision.

A lot shall consist of:

a) All dowels of the same dowel type installed on a given day;
b) A minimum of 50 dowels.

904.08.05.02    Sampling

Initially for each lot, the Contract Administrator will randomly select 5% of the dowels in that lot, or 10 dowels, whichever is greater.

In the event that a day’s installation does not produce the minimum number of dowels required for a lot, it shall be combined with the following days until the number of dowels are sufficient to meet the requirements.

If less than 10% of the dowels selected for testing (rounded down to the nearest integer) fail the pull-test, the lot of dowels will be considered acceptable.

If more than 10% of the dowels selected for testing (rounded down to the nearest integer) fail the pull-test, the Contractor shall:

a) Conduct pull-tests on all remaining untested dowels of the lot.
b) Conduct pull-tests on all dowels in each subsequent lot until the failure rate is reduced to 10% or less.

904.08.05.03    Replacement of Failed Dowels and Retesting

All dowels found to be unacceptable, including trial installation dowels, shall be replaced by the Contractor by installing a new dowel in an adjacent location approved by the Contract Administrator.

The Contractor shall remove all unacceptable dowels, repair any damage to the concrete and fill the holes with a proprietary product acceptable to the Ministry.

The Contractor shall pull-test all replacement dowels. Each replacement dowel will be accepted individually.

No dowels will be subjected to more than one pull-test.

904.10    BASIS OF PAYMENT

Section 904.10.02 of OPSS 904 is deleted and replaced with the following:
904.10.02 Dowels into Concrete – Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment and Material to do the work, including all costs associated with the pull-tests.

Payment for reinforcing steel bar, coated reinforcing steel bar, and reinforcing stainless steel bar used as dowels shall be made under the appropriate tender items in the Contract.

No payment will be made for dowels which fail the pull-test.

For any dowels that fail the pull-test as a result of concrete breakout failure and not by bond failure, payment for repairs to concrete resulting from concrete breakout failure during the pull-test and the cost of the replacement dowel will be made according to the “Extra Work” provisions of the General Conditions of Contract.

When the contract does not contain a separate tender item for providing access to the work, the contract price for the tender item “Dowels into Concrete” shall include full compensation for all labour, equipment and materials to provide the access.