CONSTRUCTION SPECIFICATION FOR CONCRETE CROSSWALK

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TS 3.65.01 SCOPE

This Specification covers the requirements for the construction of concrete crosswalks.

TS 3.65.02 REFERENCES

This Specification refers to the following specifications and publications:

Ontario Provincial Standard Specifications, Construction

OPSS 919 - Formwork and Falsework (Jan. 1995)

Canadian Standards Association (CSA)

CAN/CSA-A23.1 - Concrete Materials and Methods of Concrete Construction (Current Edition)

City of Toronto Specifications

TS 4.50 - Construction Specification for Utility Adjustments (June 2001)

TS 13.00 - Specification for Non-Structural Concrete (June 2001)

TS 501 - Amendments to OPSS 501 – Construction Specification for Compacting (June 2001)

TS 920 - Amendments to OPSS 920 – Construction Specification for Deck Joint Assemblies, Waterstops, Joint Fillers, Joint Seals and Joint Sealing Compounds - Structures (June 2001)

TS 1010 - Amendments to OPSS 1010 – Material Specification for Aggregates – Granular A, B, M, and Select Subgrade Material (June 2001)

TS 3.65.03 DEFINITIONS

For the purposes of this specification the following definitions apply:

Base Course: means a layer of specified or selected materials of planned thickness constructed on the subgrade for drainage and to distribute pavement loads.

Contraction Joint: means a cut or formed joint to regulate the location and degree of cracking in the plane of the pavement.

Expansion Joint: means a physical separation between the concrete and appurtenances, or between arts of the concrete crosswalk, which allows both horizontal and vertical movement.

Subgrade: means the soil prepared and compacted to support a structure or pavement.

TS 3.65.04 SUBMISSION AND DESIGN REQUIREMENTS

TS 3.65.04.01 General

Any required submissions shall be in writing. All submissions shall be submitted to the Commissioner at least three weeks prior to the beginning of the work.

The requirements for submissions and design requirements are given in TS 13.00.

TS 3.65.04.02 Materials

Prior to starting the work, the Contractor shall supply the Commissioner with material safety data sheets (MSDS) for all the materials to be incorporated in the work.

The Contractor shall be responsible for selecting the concrete materials and for the mix design for the concrete. The concrete mix proportions shall be selected in accordance with Section 14 of CAN/CSA-A23.1 and this Specification.

The concrete mix details and the certificate of ready mix facilities and/or the certificate of mobile mix concrete production facilities shall be submitted as required by TS 13.00.

Details of the method of curing and curing materials (including manufacturers' literature, where applicable) shall be submitted to the Commissioner.

One copy of the concrete delivery ticket shall be submitted to the Commissioner for each load of concrete delivered.

TS 3.65.05 MATERIALS

TS 3.65.05.01 Supply of Materials

Unless otherwise specified in the Contract, the Contractor shall supply all materials necessary for the execution and completion of the work.

TS 3.65.05.02 Concrete

The materials for and the production of concrete crosswalks shall meet the requirements of TS 13.00 and the following:

(i)	Cement type	Type 10 Normal Portland
(ii)	Minimum 28 day cylinder compressive strength	32 MPa
(iii)	Class of exposure	C-2
(iv)	Nominal maximum size of coarse aggregate	19 mm
(v)	Slump at point of discharge (formed concrete)	80±30 mm
(vi)	Total air content	6.5±1.5%
(vii)	Maximum water/cementing materials ratio	0.45
(viii)	Minimum cementing materials content	335 kg/m^3

TS 3.65.05.03 Granular Base and Backfill

Granular base and backfill, if required, shall be Granular 'A' and shall meet the requirements of OPSS 1010.

TS 3.65.05.04 Expansion Joint Material

Expansion joint material shall be bituminous fibreboard having a minimum thickness of 12 mm and shall meet the requirements of TS 13.00.

TS 3.65.06 EQUIPMENT

TS 3.65.06.01 Forms

Forms shall be steel, wood or metal plate forms and shall meet the requirements of OPSS 919. They shall be of sufficient cross section and strength, and so secured as to resist the pressure of the concrete when placed, and the impact and vibration of any construction equipment they support, without springing or settlement.

Forms shall be pinned or staked in place with not less than three pins for each 3 m length, and with a pin at each side of each form butt joint. The top surface of the formwork shall comply with the specified tolerances. The inside face of the form shall be vertical. The form shall deviate from grade by no more than 3 mm in 3 m, and in alignment by no more than 6 mm in 3 m.

Forms shall be cleaned and coated with form oil before each use.

TS 3.65.06.02 Finishing Tools

An aluminum or magnesium float shall be used to float the concrete crosswalk and a small edger shall be used to tool the edges.

TS 3.65.07 CONSTRUCTION

TS 3.65.07.01 Excavation

The excavation shall be to the lines and grades specified by the Commissioner. Care shall be taken to prevent damage to utilities, and other appurtenances such as water services and gas valves which may be in or under the proposed crosswalk.

At the direction of the Commissioner, the Contractor shall make good all damage caused during the course of the work and return the work to its initial condition. This shall be at the Contractor's expense.

Excavated material shall be removed from the site at the Contractor's expense.

TS 3.65.07.02 Base

TS 3.65.07.02.01 General

The granular base shall be moistened prior to the placement of concrete, but without any standing water. At the time of placing concrete, the base shall not be saturated, soft or frozen.

In areas of underground utilities, polyethylene film (100 μm thick) shall be placed on the base, as directed by the Commissioner.

TS 3.65.07.02.02 Subgrade

The subgrade shall be compacted to a minimum of 95 percent of the maximum dry density as determined by TS 501.

TS 3.65.07.02.03 Granular

Granular base shall be placed to the required thickness, as specified in the contract, and compacted to 100% as determined by TS 501.

TS 3.65.07.03 Form Placement

Forms shall be set true to the lines and grades specified in the contract and in direct contact with the base. The cross fall shall match that of the new roadway.

Sufficient formwork shall be provided to prevent its removal from the completed work until the concrete has set at least four hours.

TS 3.65.07.04 Utility Adjustment

All utility adjustments shall meet the requirements of TS 4.50, except that no boxouts will be required. The top portion of the frame shall be encased with 12 mm expansion joint material, placed flush with the surface of the concrete and the frame and cover. The fibre shall be vertical and straight in alignment.

TS 3.65.07.05 Placing Concrete

Concrete shall be placed and consolidated to meet the requirements of Clause 19 of CAN/CSA-A23.1 and the requirements of this Specification. The concrete delivery and spreading operations shall be coordinated as to provide a uniform rate of progress for the placing operation.

The concrete shall be placed to a thickness equal to the depth of the concrete road base and the proposed asphaltic concrete, but shall not be less than 200 mm. The concrete shall be thoroughly consolidated by the use of 50 mm vibrators and other suitable tools to eliminate voids, honeycombing and entrapped air.

TS 3.65.07.06 Finishing Concrete

The concrete surface shall be finished while it is sufficiently plastic to achieve the desired grades, elevations and texture, with no water on the surface. The surface shall be uniform, dense and free from undulations and projections apart from those specified in the drawings.

The top surface shall be screeded to true grade and cross-section and finished with a magnesium or aluminum float. The final finish shall have a light broom texture in the direction of the flow of vehicular traffic.

The application of water, neat cement or sand to the surface shall not be permitted. Localized surface imperfections shall be dug out and repaired with fresh concrete before the concrete has set.

The concrete adjacent to all formwork and joints shall **not** be finished with a tool that leaves any marks or rounded edges.

The surface of the concrete crosswalk shall not have irregularities exceeding 6 mm when checked with a 3 m straight edge placed in any direction.

TS 3.65.07.07 Identification Stamp

The Contractor shall mark with an approved stamp at each end of the work, at each end of the crosswalk, and all others places directed by the Commissioner. The stamp shall be located on the centre of the bay parallel to a transverse joint and approximately 150 mm from the ends of the crosswalk.

The stamp shall identify the Contractor's name and the year of construction.

TS 3.65.07.08 Joints

TS 3.65.07.08.01 Contraction Joints

Contraction joints shall be constructed by sawcutting to a depth of 50 mm. The contraction joints shall be evenly spaced at intervals not to exceed 0.8 m and shall be in the direction of the flow of vehicular traffic.

All sawcutting shall be completed within 24 hours of placing the first load of concrete.

TS 3.65.07.08.02 Expansion Joints

Expansion joints shall be placed along all outside edges of the crosswalk and along the centreline of the roadway in the direction of the flow of vehicular traffic.

Expansion joints shall be filled with 12 mm wide, bituminous fibre expansion joint material and the top surface of the bituminous fibre shall be flush with the concrete surface. The fibre shall be vertical and straight in alignment.

All edges adjacent to a layer of asphalt pavement shall have the asphalt edge routed and sealed with a bead of hot rubberized asphalt sealer, as per OPSS 920.

Full depth (isolation) joints shall be formed where the concrete abuts rigid structures, changes direction, or as shown on the contract drawings. If the face of the structure is rough or irregular, preventing a tight seal, the joint shall be placed 150 mm to 300 mm from the structure.

TS 3.65.07.08.03 Construction Joints

The crosswalk shall be constructed at least up to the centre expansion joint, as a single pour. In the event of an unavoidable stoppage of concrete placement extending more than 30 minutes, a keyed construction joint shall be placed. Where possible, the construction joint shall coincide with the planned location of a construction joint. If the stoppage occurs at a planned expansion joint, no keyed construction joint is required.

TS 3.65.07.09 Concrete Curing

Concrete curing shall meet the requirements of TS 13.00.

TS 3.65.07.10 Concrete Protection

Concrete protection shall meet the requirements of TS 13.00.

TS 3.65.08 QUALITY ASSURANCE

Quality assurance shall meet the requirements of TS 13.00.

TS 3.65.09 MEASUREMENT FOR PAYMENT

TS 3.65.09.01 Concrete Crosswalk

Measurement for the above item shall be by the area, in square metres (m^2), without any deduction for maintenance holes and appurtenances.

TS 3.65.10 BASIS FOR PAYMENT

TS 3.65.10.01 Concrete Crosswalk - Item

Payment at the contract price for the above item shall be full compensation for all labour, equipment, materials and incidentals to do the work. Payment shall include, but not be limited to, the compacting the subgrade, the supplying, placing and compacting of the granular base, constructing and sawcutting joints and the curing and protection of the concrete.

When the contract does not have a separate item, all costs associated with poured rubberized asphalt joints shall be deemed to be part of the unit price for concrete crosswalk.

When the contract does not have a separate item, all costs associated with adjusting appurtenances shall be deemed to be part of the unit price for concrete crosswalk.

When the contract does not have a separate item, all costs associated with the excavation and the compaction of the subgrade shall be deemed to be part of the unit price for concrete crosswalk.

When the contract does not have a separate item, all costs associated with the supplying, placing and compacting of the granular base shall be deemed to be part of the unit price for concrete crosswalk.