CONSTRUCTION SPECIFICATION FOR CONCRETE SIDEWALK

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351.01 SCOPE

This specification covers the requirements for the construction of concrete sidewalks.

351.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be as specified in the Contract Documents.

351.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

351.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 206	Grading
OPSS 314	Untreated Granular, Subbase, Base, Surface, Shoulder and Stockpiling
OPSS 408	Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers
OPSS 501	Compacting
OPSS 904	Concrete Structures
OPSS 919	Formwork and Falsework

Ontario Provincial Standard Specifications, Material

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1308	Joint Filler in Concrete
OPSS 1315	White Pigmented Curing Compounds for Concrete
OPSS 1350	Concrete - Materials and Production

CSA Standards

A23.1-19	Concrete materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

ASTM International

C171-07 Sheet Materials for Curing Concrete
A48M-03 Gray Iron Castings

351.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Cold Weather means as defined in OPSS 904.

Hot Weather means as defined in OPSS 1350.

Sidewalk Bay means the area between two transverse joints, regardless of the type of joint.

351.04 DESIGN AND SUBMISSION REQUIREMENTS

351.04.02 Submission Requirements

351.04.02.01 General

Prior to starting the work, documentation shall be submitted, verifying that the Contractor's representative of the placing crew shall be on site and shall have the certification as specified in Contract Documents.

351.04.02.02 Tactile Walking Surface Indicator Plate Submission Requirements

One copy of the manufacturer's installation instructions and Working Drawings for each type of tactile walking surface indicator plates shall be submitted to the Contract Administrator prior to the installation of the plates.

When requested, a certificate from the manufacturer for the tactile walking surface indicator plates that confirms the product was manufactured and met the test requirements according to the Contract Documents shall be submitted to the Contract Administrator. The certificate shall include test results from an independent testing laboratory currently accredited by the Standards Council of Canada.

351.05 MATERIALS

351.05.01 Concrete

Concrete shall be according to OPSS 1350, with a minimum specified 28-Day compressive strength of 32 MPa, Class C-2 Exposure. Coarse aggregate for the concrete shall have a nominal maximum size of 19.0 mm.

351.05.02 Expansion Joint Material

Expansion joint filler material shall be asphalt impregnated fibreboard having a minimum of 12 mm thickness and shall be according to OPSS 1308, Type A.

Hot poured rubberized asphalt joint sealing compound shall be according to OPSS 1212.

351.05.03 Subgrade Moisture Vapour Barrier

Subgrade moisture vapour barrier shall be according to ASTM C171.

351.05.04 Granular

Granular base shall be according to OPSS 1010.

351.05.05 Curing Compound

Curing compound shall be according to OPSS 1315.

351.05.06 Tactile Walking Surface Indicator Plates

Cast iron tactile walking surface indicator plates shall be as specified in the Contract Documents. Castings shall be according to ASTM A48M, Class 35B, and shall be bare and not coated with paint or other coatings or substances. Castings shall be sound, free from pouring faults, cracks, blowholes, and other defects.

The initials or trademark of the manufacturer, year of manufacture, and country of manufacture shall be distinctly cast and legible in raised letters on the top side of each plate.

351.05.07 Alternate Material

Where alternate material (instead of cast iron) is to be used, it shall be as specified in the Contract Documents.

351.06 EQUIPMENT

351.06.01 Forms

Forms shall be according to OPSS 919.

351.06.02 Slip Forming

The equipment used for slip forming shall have automatic horizontal and vertical alignment controls shall be used in conjunction with at least one stringline.

351.07 CONSTRUCTION

351.07.01 General

The work required for concrete sidewalk shall include earthwork, granular base, compaction, preparation work, formwork, Utility adjustment and isolation, concrete placing and finishing, jointing, curing, and protection.

Concrete sidewalk shall be constructed at the locations and to the widths and thicknesses specified in the Contract Documents.

Excavation and embankment construction shall be according to OPSS 206.

351.07.02 Grading Tolerances

351.07.02.01 Subgrade

When the subgrade is prepared for:

a) granular base, the finished subgrade surface shall be within a 15 mm deviation measured at any point on a 3 m long straight edge.

b) sidewalk, the finished subgrade surface shall be within a 12 mm deviation from the specified grade and cross-section, with the surface being within a 10 mm deviation measured at any point on a 3 m long straight edge.

351.07.02.02 Granular Base

Placement of granular base material shall be according to OPSS 314.

When a granular base is prepared for sidewalk, the finished granular surface shall be within a 12 mm deviation from the specified grade and cross-section, with the surface being within a 10 mm deviation measured at any point on a 3 m long straight edge.

351.07.03 Compaction

Compaction shall be according to OPSS 501.

351.07.04 Preparation Work

Before placing concrete on:

a) subgrade, the subgrade shall be wetted down, except where clays occur.

b) granular base, the granular immediately ahead of the concrete placing operation shall be wetted down thoroughly.

The wetting down shall be carried out without leaving standing water.

Alternatively, a subgrade moisture vapour barrier may be placed to completely cover the subgrade under the sidewalk. Adjacent strips shall be lapped 100 mm minimum and ends shall be lapped 300 mm minimum.

351.07.05 Form Setting

Throughout their entire length, forms shall be set true to the lines, grades, and thickness specified in the Contract Documents and in direct contact with the subgrade or granular base.

351.07.06 Utility Adjustment

Work done on adjustment of maintenance holes, valve chambers, and catch basins shall be according to OPSS 408. Utilities shall be adjusted flush with the surface of the new sidewalk.

Utilities maintained by third-parties other than the Owner shall be adjusted by the third-party companies concerned under arrangement by the Contract Administrator.

The edge of the Utilities shall be excavated and the required grade of the new sidewalk shall be indicated.

351.07.07 Utility Isolation in Sidewalk

The required Utility isolations shall be constructed in the concrete sidewalk to the details and at the locations specified in the Contract Documents.

351.07.08 Placing Concrete

Concrete shall be placed and consolidated according to CSA A23.1. Any excess concrete beyond the sidewalk edge shall be removed. Concrete shall be placed by a continuous pour method. Where concrete placing is interrupted for more than 45 minutes a 12 mm thick asphalt impregnated fibreboard joint filler

shall be installed vertically full depth across the sidewalk width, to form an expansion joint, before resuming concrete placing.

Concrete shall not be placed against any material which is at a temperature above 35 °C or against any material whose temperature is below 0 °C.

351.07.09 Tactile Walking Surface Indicator Plate Installation

A set of two cast iron tactile walking surface indicator plates shall be set into wet prepared concrete at each concrete sidewalk ramp as specified in the Contract Documents and according to the plate manufacturer's installation instructions.

Plates shall be cleaned after installation.

351.07.10 Concrete Finishing

Finishing of the concrete surface shall take place while the concrete is sufficiently plastic to achieve the desired grades, elevations, and texture, according to CSA A23.1.

The surface of the sidewalk shall be uniform, dense, free from undulations and projections, struck off true to grade and cross-section, and finished with a magnesium or aluminum float.

Care shall be taken to avoid over finishing or working more mortar to the surface than is actually required.

Excessive fines and water shall not be drawn to the surface.

Surface evaporation retardants shall not be used as an aid for finishing concrete.

The application of water, cement, or combination of both to the concrete surface shall not be permitted as a finishing aid.

Localized defects shall be repaired using concrete.

The sidewalk shall be given a broomed texture after finishing with a magnesium or aluminum float.

The concrete adjacent to all formwork shall be finished with a tool that produces a 5 mm rounded edge and a smooth, horizontal surface with a maximum width of 50 mm. All tooling shall be uniform and straight and shall be depressed no more than 1 mm below the adjacent surface. Any ridges along the tooled marks shall be removed. Contraction and expansion joints shall not be finished with a tooled edge.

The presence of footprints or other marks in the completed sidewalk shall require saw cutting, removal, and replacement of the complete sidewalk bay.

351.07.11 Joints

351.07.11.01 General

Longitudinal and transverse joints shall be constructed of the type and at the locations specified in the Contract Documents.

351.07.11.02 Dummy Joints

Dummy joints shall be formed when specified in the Contract Documents.

351.07.11.03 Contraction Joints

Contraction joints shall be placed at a maximum of 4.5 m spacing. and shall be saw cut or formed to a depth that is one quarter the thickness of the sidewalk.

When the sidewalk width is 2.5 m or greater, a longitudinal contraction joint shall be sawn or formed at a maximum spacing interval of 1.5 m.

351.07.11.04 Expansion Joints

Expansion joints shall be constructed to the full depth of the sidewalk.

Expansion joints shall be filled full depth with 12 mm thick asphalt impregnated fibreboard joint filler material and shall be clean and dry at the time of construction.

Isolation joints shall be constructed full depth where the sidewalk abuts a rigid object or changes direction.

351.07.11.05 Construction Joints

At the end of each day's work, or in the event of an unavoidable stoppage of concrete placement extending more than 45 minutes, an expansion joint shall be constructed at the planned location of a joint.

351.07.12 Identification Stamp

At the request of the Contract Administrator, the sidewalk shall be clearly and legibly marked with an approved stamp each end of the work, and at other places as directed. The stamp shall be centred on the sidewalk bay next to and parallel to a transverse joint. The stamp shall identify the Contractor's name and the year of construction.

351.07.13 Concrete Curing

Concrete curing shall be according to OPSS 904.

351.07.14 Cold Weather Concreting

The placing and protection of concrete sidewalks in cold weather shall be according to OPSS 904.

351.07.15 Hot Weather Concreting

Where the air temperature exceeds 28 ^{o}C and the concrete temperature exceeds 25 ^{o}C, the discharge time shall be reduced to a maximum of one hour after the introduction of mixing water. Concrete shall not be placed in air temperatures exceeding 35 ^{o}C.

351.07.16 Protection of Sidewalk

Vehicular traffic, including construction equipment, shall be restricted from crossing the sidewalk after the concrete has been placed for a minimum period of three days or until the concrete has attained 20MPa.

351.07.17 Sidewalk Tolerances

The surface of the concrete, after texturing, shall be within a 6 mm deviation measured at any point on a 3 m long straight edge.

The minimum acceptable thickness of the sidewalk shall be the specified thickness minus 8 mm. If the thickness deficiency exceeds 8 mm, the sidewalk shall be removed and replaced.

Core samples of the finished concrete may be taken to establish the actual thickness of the slab at locations determined by the Contract Administrator.

Unacceptable areas of sidewalk identified by the Contract Administrator shall require the saw cutting, removal, and replacement of the complete sidewalk bay.

351.07.18 Tactile Walking Surface Tolerances

Tolerances for the tactile walking surface indicator plates shall be as specified in the Contract Documents. If the tactile walking surface indicator plates are not within the specified tolerances, the plates shall be rejected.

Rejected plates shall be removed and replaced as directed by the Contract Administrator.

351.07.19 Field Sampling and Testing of Concrete

Field sampling and testing of concrete shall be according to OPSS 1350.

351.07.20 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

351.09 MEASUREMENT FOR PAYMENT

351.09.01 Actual Measurement

351.09.01.01 Concrete Sidewalk

Measurement of concrete sidewalk shall be by area in square metres.

351.09.01.02 Tactile Walking Surface Indicators for Concrete Sidewalk Ramps

For measurement purposes a count shall be made for each tactile walking surface indicator plates installed at each concrete sidewalk ramp.

351.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

351.10 BASIS OF PAYMENT

351.10.01 Concrete Sidewalk - 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.

Repair or removal and replacement of an unacceptable sidewalk bay shall be completed at no extra cost to the Owner.

351.10.02 Tactile Walking Surface Indicators for Concrete Sidewalk Ramps – 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.

351.10.03 Excavation

Payment for excavation shall be under the tender item Earth Excavation, Grading or Rock Excavation, Grading according to OPSS 206.

351.10.04 Utility Adjustment

Payment for the adjustment of Utilities shall be paid under the appropriate items according to OPSS 408.

No payment shall be made for utilities adjusted by third-party companies.

Appendix 351-A, November 2021
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Certification such as Municipal Exterior Flatwork Certification, or ACI Flatwork Certification, or approved equivalent. Where ACI Flatwork Certification means the certification issued by the American Concrete Institute, after demonstrating knowledge and the ability to place, consolidate, finish, edge, joint, cure and protect concrete flatwork. And where Municipal Exterior Flatwork Certification means the certification issued by Ready Mixed Concrete Association of Ontario (RMCAO), after demonstrating knowledge to place, consolidate, finish, edge, joint, cure and protect concrete flatwork. (351.04.02)

- Alternate tactile plates' material details (351.05.07)

- Locations of sidewalks wider than 1.5m in areas with higher pedestrian volumes (see TAC GDG, Section 2.2.6.5 and MTO GDSOH, Section D.8.4) (351.07.01)

- Line, grade, and thickness requirements of concrete sidewalk (351.07.01 and 351.07.05)

- Details and locations of required Utility isolations (351.07.07)

- Designer shall specify if Dummy Joints are required. (351.07.11.02)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

The curved plates should only be used with drop-curb settings.

According to the Canadian National Institute for the Blind (CNIB), as of 2019, it is understood that the alignment of tactile plates DO NOT indicate direction.

Related Ontario Provincial Standard Drawings

OPSD 310.010	Concrete Sidewalk
OPSD 310.020	Concrete Sidewalk Adjacent to Curb and Gutter
OPSD 310.030	Concrete Sidewalk Ramps at Intersections
OPSD 310.031	Concrete Sidewalk Ramps at Signalized Intersections with Intersecting Crosswalks
OPSD 310.033	Concrete Sidewalk Ramps at Unsignalized Intersections
OPSD 310.039	Concrete Sidewalk Ramps Tactile Walking Surface Indicators Component
OPSD 310.040	Utility Isolation in Concrete Sidewalks
OPSD 310.050	Concrete Sidewalk Driveway Entrance Details
OPSD 310.060	Joint Detail for Concrete Pedestrian Crosswalk at Signalized Intersection