



CONSTRUCTION SPECIFICATION FOR THE INSTALLATION OF INTERLOCKING CONCRETE PAVERS

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355.01 SCOPE

This specification covers the requirements for the installation of interlocking concrete pavers for pavements, sidewalks, boulevards, and medians. The work includes the grading, placement of subsurface drainage, subbase, base, bedding sand, joint sand, edge restraints, and interlocking concrete pavers. This specification applies to both manual and mechanical installations.

355.01.01 Significance and Use of Appendices

Appendices are not a mandatory part of the specification unless invoked by the Owner.

Appendix 355-A is a commentary appendix to provide designers with information on the use of the specification in a Contract.

355.02

REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 206	Grading
OPSS 310	Hot Mix Asphalt
OPSS 314	Untreated Granular, Subbase, Base, Surface Shoulder, and Stockpiling
OPSS 350	Concrete Pavement and Concrete Base
OPSS 405	Pipe Subdrains
OPSS 501	Compacting

Ontario Provincial Standard Specifications, Material

OPSS 1001	Aggregates - General
OPSS 1002	Aggregates - Concrete
OPSS 1004	Aggregates - Miscellaneous
OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1860	Geotextiles

Canadian Standards Association

A231.2-95 (R2005)	Precast Concrete Pavers
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355.03

DEFINITIONS

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

Bedding Sand means a layer of uncompacted sand that is screeded smooth prior to placement of the concrete pavers.

Concrete Paver means a precast concrete paving product.

Edge Paver means a precast concrete unit made or field cut with a straight side for placement flush with a concrete curb or other edge restraint.

Edge Restraint means a curb, edging, building, or other appurtenance that is intended to confine the bedding sand and concrete pavers so that the concrete pavers do not spread and lose interlock.

Joint Sand means a fine, dry sand used to fill the joint space and interlock the concrete pavers.

Laying Face means the exposed working face of a row of concrete pavers on the bedding sand.

Manufactured Sand means sand produced by the crushing and further processing, i.e., washing, grading, classifying of quarried rock, boulders, cobbles, or gravel from which the natural fine aggregate has been removed.

355.04 SUBMISSION AND DESIGN REQUIREMENTS

355.04.01 Submission Requirements

Laboratory test results indicating compliance to material requirements and a full-size sample of each type of concrete paver shall be submitted to the Contract Administrator at least 10 Business Days prior to commencement of paver installation.

355.05 MATERIALS

355.05.01 Granular Subbase

The granular subbase material shall be Granular B according to OPSS 1010.

355.05.02 Granular Base

The granular base material shall be Granular A according to OPSS 1010.

355.05.03 Bedding and Joint Sand

Bedding sand shall meet the requirements of concrete sand according to OPSS 1002. For applications under vehicular traffic, manufactured sand shall be used. Limestone screenings or stone dust shall not be used.

Joint sand shall be dry and meet the gradation requirements of mortar sand according to OPSS 1004 and the physical requirements according to OPSS 1002.

The bedding and joint sand shall be free of organics and deleterious soluble salts or other contaminants.

355.05.04 Concrete Pavers

Concrete pavers shall be according to CAN3-A231.2. Concrete paver size, shape, colour, thickness, and texture shall be as specified in the Contract Documents.

Mechanically installed concrete pavers shall have integral spacer nibs on all vertical faces to control joint spacing.

355.05.05 Edge Restraints

Edge restraints shall be as specified in the Contract Documents.

355.05.06 Geotextile

Geotextile shall be non-woven, Class 1, according to OPSS 1860 with an FOS of 60 to 120 µm.

355.06 EQUIPMENT

355.06.01 Compaction

Concrete pavers shall be set into the bedding sand using a high frequency, low amplitude, mechanical flatplate vibratory compactor having a plate area sufficient to cover a minimum of 12 concrete pavers. The compactor shall transmit an effective force of not less than 75kN per square metre of plate area. The frequency of vibration shall be within the range of 75 to 100Hz.

Pneumatic-tired roller shall have a gross weight of 10 tonnes.

355.07 CONSTRUCTION

355.07.01 Subgrade Preparation

Preparation of the subgrade shall be according to OPSS 206.

355.07.02 Subbase and Base

When the interlocking concrete pavers are being placed on:

- a) Granular base, the base and subbase layers shall be constructed according to OPSS 314.
- b) Concrete base, the base layer shall be constructed according to OPSS 350.
- c) Asphalt base, the base layer shall be constructed according to OPSS 310.

and to the depth specified in the Contract Documents.

Both granular subbase and base shall be compacted according to OPSS 501.

355.07.03 Subsurface Drainage

Subsurface drainage shall be as specified in the Contract Documents. Subdrains shall be constructed according to OPSS 405.

Geotextile shall be installed at all drain locations between the bedding sand and the drain surface extending 100 mm beyond the drain in all directions.

355.07.04 Bedding Sand

355.07.04.01 Placement

The bedding sand shall be placed loose, in a uniform layer with sufficient depth to achieve the final compacted thickness of 20 to 30 mm.

355.07.04.02 Screeding

The bedding sand shall be screeded in a loose condition and protected against compaction prior to placement of the concrete pavers.

355.07.05 Edge Restraint

Edge restraints shall be provided along the perimeter of all concrete paver installations.

355.07.06 Laying Pattern

Concrete pavers shall be installed in the pattern specified in the Contract Documents. Cutting of the concrete pavers, the use of infill concrete, and discontinuities in pattern shall only be allowed along the outer pavement boundaries and adjacent to drains, maintenance holes, edge restraints, and other appurtenances. Where partial concrete pavers are required, they shall be sawcut. No less than one-third of a concrete paver shall be used in pavement subjected to vehicular traffic.

355.07.07 Placement

Concrete pavers shall be placed uniformly to achieve normal joint spacing of 2 to 5 mm between adjacent concrete pavers and such that all joints are aligned.

Concrete pavers shall only be placed on loose moist bedding sand.

355.07.08 Compaction

355.07.08.01 Initial Compaction

After placement, compactive effort shall be applied to the concrete pavers to achieve compaction of the bedding sand and to achieve proper grade. At least three passes of a plate compactor shall be made across the surface of the concrete pavers.

355.07.08.02 Joint Sand Compaction

After initial compaction, dry joint sand shall be uniformly spread over the concrete pavers and swept to fill in the joints. At least two passes of a plate compactor shall be applied to the surface while simultaneously sweeping the sand into the joints. Joints shall be completely filled at the completion of compaction. Excess sand shall then be removed from the pavement surface by sweeping.

355.07.08.03 Final Compaction

On pavements subject to vehicular traffic, final compaction shall be achieved by not less than 10 passes of a pneumatic-tired roller.

355.07.09 Surface Tolerance

The surface of the concrete pavers is to be such that when tested with a 3 m long straightedge placed in any direction on the surface, except across the crown or drainage gutters, the gap between the bottom of the straightedge and the surface of the concrete pavers shall not be greater than 3 mm for vehicular applications and not greater than 6 mm for other applications.

355.07.10 Removal of Unacceptable Concrete Pavers

All loose concrete pavers and concrete pavers that do not meet the surface tolerance shall be removed and reinstalled.

All damaged concrete pavers shall be removed and replaced.

355.07.11 Management of Excess Material

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

355.09 MEASUREMENT FOR PAYMENT

355.09.01 Actual Measurement

355.09.01.01 Interlocking Concrete Pavers

Measurement shall be made for the area of concrete pavers placed in square metres without deduction for maintenance hole covers, utility poles, and other appurtenances.

355.09.02 Plan Quantity Payment

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

355.10 BASIS OF PAYMENT

355.10.01 Interlocking Concrete Pavers-Item

Payment at the Contract price for the above item shall be full compensation for all labour, Equipment, and Material to do the work.

Removal and reinstallation of loose concrete pavers or concrete pavers not meeting surface tolerances shall be at no extra cost to the Owner.

Removal and replacement of damaged concrete pavers shall be at no extra cost to the Owner.

Appendix 355-A, Commentary for OPSS 355, November 2006

Note: This appendix does not form part of the standard specification. It is intended to provide information to the designer on the use of this specification in a contract.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Size, shape, colour, thickness, and texture of the concrete pavers. (355.05.04)
- Type of edge restraint. (355.05.05)
- Type and depth of subbase and base required for traffic loads and soil conditions. (355.07.02)
- Subsurface drainage requirements and adequate drainage of the bedding sand at low points. (355.07.03)
- Pattern of concrete pavers. (355.07.06)

Application should be restricted to roads with traffic speeds of 70 km/h or less.

A herringbone pattern at 45° to the vehicular traffic is recommended for roadway pavements.

Where surface sealers are specified, a reduction in frictional resistance may result.

Related technical publications for designers' use are available from the Interlocking Concrete Pavement Institute (ICPI) at www.icpi.org.

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

Related Ontario Provincial Standard Drawings

OPSD 561.010	Interlocking Concrete Pavers on Granular Base
OPSD 561.020	Interlocking Concrete Pavers on Concrete or Asphalt Base
OPSD 561.030	Interlocking Concrete Pavers for Retrofit Crosswalk Installation