



Note: The MUNI implemented in November 2021 replaces OPSS 710 COMMON, November 2010 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR PAVEMENT MARKING

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710.01	SCOPE
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This specification covers the requirements for the application of pavement markings onto bituminous or concrete pavement.

710.01.01 Specification Significance and Use

This specification has been developed for use in municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

710.01.02 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.

710.02 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, Material

OPSS 1712	Organic Solvent Based Traffic Paint
OPSS 1713	Thermoplastic Pavement Marking Materials
OPSS 1714	Field Reacted, Polymeric Pavement Marking Materials
OPSS 1715	Preformed Plastic Pavement Marking Tape
OPSS 1716	Water-Borne Traffic Paint
OPSS 1750	Traffic Paint ReflectORIZING Glass Beads

Ontario Ministry of Transportation Publications

Manual of Uniform Traffic Control Devices for Ontario, MUTCD

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

Durable Pavement Markings mean pavement markings produced by either thermoplastics, field reacted polymer, or a preformed plastic tape of durable type.

Field Reacted Polymeric Pavement Marking Material means a pavement marking material consisting of two separate components, a polymerizable component and a curing agent or a polymerization catalyst. These two components are designed to be mixed at the site at recommended proportions and applied during the pot life of the mixture.

Hot Applied Thermoplastic Pavement Marking Material means a thermoplastic material that is specifically formulated for hot spray or screed application.

Organic Solvent Based Traffic Paint means a traffic paint whose components are carried in an organic solvent system and will form a solid paint film on evaporation of the solvent after application.

Pavement Markings mean markings on pavements used to delineate vehicle operating limits on highways and streets according to the size and shape, as specified in the MUTCD.

Permanent Pavement Markings mean pavement markings placed other than temporary pavement markings or short term pavement markings.

Preformed Plastic Pavement Marking Tape means plastic material specifically designed and preformed into pliable rolls or ribbons of various lengths and widths or into symbols.

Premarking means the indicating marks required to identify the position of pavement markings.

Reflectorization means a material, treatment, or process to enable incident light to be returned in high proportions in the general direction of the light source.

Short Term Pavement Markings mean the markings placed prior to the placement of permanent pavement markings on any milled, levelling, binder or top course pavements where existing lane widths, arrangements, and alignments are maintained.

Temporary Pavement Markings mean pavement markings placed on temporary roadway surfaces or alignments during construction.

Temporary Pavement Marking Material means pavement marking materials designed to maintain a service life of a minimum of three months.

Temporary Pavement Markings – Removable mean pavement markings using materials designed to be removed after use.

Temporary Raised Pavement Markers mean raised reflective devices.

Traffic Paint means a paint specifically formulated for use as a pavement marking.

Water-Borne Traffic Paint means a traffic paint whose components are carried in water either as an emulsion or a dispersion and will form a solid paint film on deposition and evaporation of water and volatiles after application.

710.04 DESIGN AND SUBMISSION REQUIREMENTS

710.04.01 General

One-litre samples of solvent based and/or water-borne paint; 500 g samples of thermoplastics; 500 g sample of field reacted polymeric materials with an adequate amount of catalyst or curing agent; one metre section of preformed pavement marking tape and a 200 g sample of reflectorizing glass beads to be used on the Contract shall be supplied to the Owner one month prior to use, prepaid, by the Contractor.

If any sample fails to conform to the specification requirements, none of the batch from which the sample was taken shall be used. New batches shall be obtained at no additional cost to the Owner and the new batches shall be tested until an acceptable batch is obtained.

710.05 MATERIALS

710.05.01 Classification

Pavement markings are classified into the following types based on performance requirements:

- a) Traffic Paint
- b) Pavement Marking - Durable
- c) Pavement Marking - Temporary
- d) Pavement Marking - Temporary - Removable

710.05.02 Organic Solvent Based Traffic

Organic solvent based traffic paint shall be according to OPSS 1712.

710.05.03 Thermoplastic Pavement Marking Materials

Thermoplastic pavement marking materials shall be according to OPSS 1713.

710.05.04 Field Reacted Polymeric Pavement Marking Materials

Field reacted polymeric pavement marking materials shall be according to OPSS 1714.

710.05.05 Preformed Plastic Pavement Marking Tape

Preformed plastic pavement marking tape shall be according to OPSS 1715.

710.05.06 Water-Borne Traffic Paint

Water-borne traffic paint shall be according to OPSS 1716.

710.05.07 Special Considerations

Materials not conforming to the no-tracking time requirements of the applicable specification, may be used when approved by the Owner.

710.06 EQUIPMENT

710.06.01 General

The equipment to be used for application or installation of pavement markings shall be as recommended by the manufacturer of the respective pavement marking material.

710.06.02 Spray Equipment

710.06.02.01 General

Spray equipment shall be used for application of solvent based traffic paint, water-borne traffic paint, thermoplastics, and field reacted polymeric material recommended for spray application.

Spray equipment shall be fabricated from materials that will not contaminate the traffic paint and other pavement marking materials.

The spray equipment shall provide a uniform stripe to the required width and thickness, with sharp edges without excessive splatter or overspray. The equipment shall have the capability to provide pavement markings according to the MUTCD. The equipment shall be provided with glass bead dispenser to apply overlay glass beads at the recommended rate.

710.06.02.02 Thermoplastic Pavement Markings

Equipment to be used for the application of thermoplastic material shall be capable of mixing, maintaining, and applying the material at the recommended temperature.

710.06.03 Other Methods of Application

Field reacted polymeric materials and thermoplastics shall be applied using a screed applicator.

Preformed plastic tape shall be installed according to the manufacturer's recommendations.

710.07 CONSTRUCTION

710.07.01 General

As part of the work, the Contractor shall supply pavement marking and symbols according to the applicable shapes and sizes as specified in the MUTCD.

The Contractor shall apply the pavement marking and symbols according to the Contract Drawings, when provided, MUTCD and the manufacturer's recommendations.

The work of pavement marking includes: providing samples of materials for testing for conformity to the appropriate material specification, surface preparation, pavement marking obliterating, premarking, application of temporary, short term, and permanent pavement markings.

Where the pavement marking scheme is not shown in the Contract Drawings, it shall be according to the MUTCD or be provided by the Owner.

710.07.02 Surface Preparation

The pavement surface must be clean and dry. Contaminants such as dirt, loose asphalt particles, and oily residue shall be removed prior to application of pavement marking.

710.07.03 Pavement Marking Obliterating

Durable markings and traffic paint shall be obliterated or removed using the method specified in the Contract Documents at the locations specified.

710.07.04 Premarking

The Contractor shall provide the necessary measurements required to establish the position of all pavement markings.

710.07.05 Temporary Pavement Marking

Temporary markings shall include surface preparation, premarking, and placement of temporary markings.

Temporary pavement marking shall be placed on temporary road surfaces prior to the opening to the general public according to the MUTCD or as specified in the Contract Documents.

710.07.06 Short Term Pavement Marking

Short term pavement marking is required when a paved roadway is to be opened to the general public prior to the application of permanent pavement markings.

As part of the work of pavement marking, the Contractor shall apply short term pavement markings for the centreline and lane lines.

Short term pavement markings shall be applied according to the MUTCD and as amended by Table 1.

Short term pavement markings shall not conflict with permanent pavement markings.

Short term pavement markings placed on final surface course shall be of the removable type.

A temporary raised pavement marker may be used in place of one 0.3 m line.

710.07.07 Permanent Pavement Marking

Permanent pavement marking includes surface preparation, premarking, short term pavement marking, removal of short term pavement markings, and placement of permanent pavement markings.

When permanent pavement markings cannot be placed prior to the opening to traffic, Freeways, Major, and Minor Roadways must have short term pavement markings according to Division C of the MUTCD and as amended by Table 1.

Permanent pavement markings must be in place and maintained prior to any winter shut down.

TABLE 1
Short Term Pavement Markings

Type of Marking Note 1	Type of Roadway	Length of Lines Min.	Length of Gaps Max.	Length of Time Before Permanent Markings are Placed Max.
A	Freeway - six Lanes or Greater, Three Lanes per Direction	3 m Note 2	9 m Note 2	15 Working Days
B	Freeway - Four Lanes, Two Lanes per Direction	0.3 m	15 m	15 Working Days
C	Major Roadways- Six Lanes or Greater, Three Lanes per Direction	3 m Note 2	6 m Note 2	15 Working Days
D	Major Roadways - Four Lanes, or Less	0.3 m	15 m	15 Working Days
E	Minor Roadways	0.3 m	15 m	20 Working Days

Notes: 1. Type of marking as specified elsewhere in the Contract.
2. Same as MUTCD.

710.07.08 Selection of Materials

When the item Pavement Marking, or Pavement Marking Symbols, is called for, the Contractor is restricted to traffic paint.

When the item Pavement Marking, Durable, or Pavement Marking Symbols, Durable is called for, the Contractor's choice of material is restricted to:

- a) Durable preformed plastic tape.
- b) Field reacted polymeric pavement marking material.
- c) Thermoplastic pavement marking material.

When the item Pavement Marking, Temporary, or Pavement Marking Symbols, Temporary, is called for the Contractor may choose from all marking materials.

When the item Pavement Marking, Temporary Removable, or Pavement Marking Symbols, Temporary - Removable is called for, the Contractor's choice of material is restricted to temporary preformed, removable pavement marking tape.

Selection of pavement marking material for use on a particular type of pavement surface shall according to the manufacturer's recommendations.

710.07.09 Application

710.07.09.01 General

All pavement markings shall be accurately spaced and present a clean-cut, uniform appearance during either the day or night.

The application of pavement marking materials shall be according to the following requirements and the manufacturer's recommendations.

710.07.09.02 Organic Solvent Based Traffic Paint

Paint shall be applied when the pavement surface temperature is 5 °C and above, unless otherwise approved in writing by the Owner.

Paint shall be applied at a rate which results in a uniform thickness of 230 microns ± 25 microns dry film. Reflectorizing glass beads according to OPSS 1750, shall be applied uniformly at a rate as shown below, immediately after paint application to ensure embedment of the glass beads.

Overlay glass beads shall not be applied on to black paint which is used for obliterating previous markings.

Rate of Application for Overlay Glass Beads per litre of Traffic Paint	
% Volume Solids of Traffic Paint	Glass Beads Required in kg
40-56	0.7
57-70	0.8

The paint temperature shall be between 40 and 70 °C when applied to the pavement.

710.07.09.03 Water-Borne Traffic Paint

Paint shall be applied as specified in clause 710.07.09.02 except that the pavement surface temperature shall be 10 °C and above.

710.07.09.04 Thermoplastic Pavement Marking Material

The material shall be applied when the pavement surface temperature is 5 °C and above. The maximum relative humidity shall be 70%. At pavement surface temperatures below 5 °C, the pavement shall be preheated immediately prior to material application.

Thermoplastics shall be applied at a rate which results in a uniform thickness of 1.90 mm ± 0.40 mm, measured dry. Markings shall not be applied over pavement joints.

Reflectorizing glass beads according to OPSS 1750, with the exception of the requirements for silicone coating shall be applied uniformly at a rate of 1.5 kg ± 0.10 kg per 10 m² of marking immediately after marking material applications and before the material hardens.

710.07.09.05 Field Reacted Polymeric Pavement Marking Materials

Field reacted polymeric pavement marking materials which are recommended for screed application shall be applied at a rate which results in a uniform thickness of 1.90 mm ± 0.40 mm, measured dry. Markings shall not be applied over pavement joints.

Materials shall be applied when the pavement surface temperature is 5 °C and above. The maximum surface temperature shall be 35 °C. The maximum relative humidity shall be 70%.

Reflectorizing glass beads according to OPSS 1750, with the exception of the requirement for silicone coating, shall be applied uniformly at a rate of 1.5 kg ± 0.10 kg per 10 m² of marking, immediately before the material hardens.

Field reacted polymeric pavement marking materials recommended for spray application shall be applied at a uniform thickness of 0.30 mm ± 0.15 mm, unless otherwise approved in writing by the Owner.

710.07.09.06 Preformed Plastic Tape

The tape shall be applied when the pavement surface temperature is 21 °C and above. The maximum relative humidity shall be 70%.

Joints of marking tape shall be butt joints without overlaps. Preformed markings shall not be applied over pavement joints.

710.07.09.07 Pavement Marking, Temporary Removable

Temporary removable pavement markings shall be applied according to the manufacturer's recommendation and shall be removed as specified. Removed material shall be disposed of outside the right-of-way.

710.07.09.08 Raised Pavement Markers, Temporary

The Contractor shall supply and install temporary raised pavement markers according to the Owner's requirements and the manufacturer's recommendations. Markers used shall be capable of remaining in place for a period of one to six months as specified in the Contract Documents. Temporary raised pavement markers shall be removed as specified in the Contract Documents. Removed material shall be disposed of outside the right-of-way.

710.08 QUALITY ASSURANCE

710.08.01 General

Random sampling may be carried out by the Owner during material application to assess line quality.

710.08.02 Line Quality

Line width, thickness, the nature of the edges, and uniformity in appearance will be assessed by the Owner. The dry film thickness will be measured by a paint inspection gauge or a coating thickness gauge.

Glass bead distribution will be inspected for evenness in distribution, degree of embedment, and retroreflectance.

710.08.03 Measurement of Temperature and Humidity

The testing of ambient and surface temperature will be by thermometer, and surface thermometer, respectively. Humidity will be measured using recording hygrometer.

710.09 MEASUREMENT FOR PAYMENT

710.09.01 Actual Measurement

**710.09.01.01 Pavement Marking
Pavement Marking, Durable
Pavement Marking, Temporary
Pavement Marking, Temporary - Removable
Pavement Marking Obliterating**

Measurement of pavement marking shall be by the horizontal length in metres of 10 cm wide line excluding gaps. Wider lines are measured in 10 cm equivalents.

Each symbol to be obliterated shall be approximately equated in area to a 10 cm wide line.

**710.09.01.02 Pavement Marking Symbols
Pavement Marking Symbols, Durable
Pavement Marking Symbols, Temporary
Pavement Marking Symbols, Temporary - Removable
Raised Pavement Markers, Temporary**

For measurement purposes, a count shall be made of the number of pavement marking symbols and raised pavement markers.

710.09.02 Plan Quantity Measurement

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

710.10 BASIS OF PAYMENT

**710.10.01 Pavement Marking - Item
Pavement Marking Symbols - Item
Pavement Marking, Durable - Item
Pavement Marking Symbols, Durable - Item
Pavement Marking, Temporary - Item
Pavement Marking Symbols, Temporary - Item
Pavement Marking, Temporary Removable - Item
Pavement Marking Symbols, Temporary - Removable - Item
Raised Pavement Markers, Temporary - Item
Pavement Marking Obliterating - Item**

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

**Appendix 710-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:

- Method and locations of markings and paint obliteration and removal. (710.07.03)
- Temporary pavement marking requirements. (710.07.05)
- Type of markings. (710.07.07)

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

Related Ontario Provincial Standard Drawings

No information provided here.