



CONSTRUCTION SPECIFICATION FOR SINGLE AND DOUBLE SURFACE TREATMENT

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304.01 SCOPE

This specification covers the requirements for surface preparation, application of bituminous binder, and application of aggregate for single and double surface treatment.

304.01.01 Significance and Use of Appendices

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

Appendix 304-A is a commentary appendix to provide designers with information on the use of the specification in a Contract.

304.02 REFERENCES

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

Ontario Provincial Standard Specifications, Material

OPSS 1006 Aggregates - Surface Treatment
OPSS 1103 Emulsified Asphalt

Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 7 - Temporary Conditions

304.03 DEFINITIONS

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

Appurtenances mean maintenance hole, catch basin, valve chamber, and water valve covers and similar Utility access covers located within the paved portion on the roadway.

Binder means an emulsified asphalt with or without polymer modification used to bind aggregates.

Double Lap means the coverage produced from the application of binder where the binder from each spray bar nozzle overlaps the binder application from the adjacent nozzle by one half.

Double Surface Treatment means two successive single surface treatments.

End Nozzle means a spray bar nozzle which delivers binder to the inside half of a standard spray pattern.

Lot means the quantity of work completed with a tanker truck shipment of binder.

Single Surface Treatment means a single application of bituminous binder followed by a single application of Class 1, Class 2, Class 3, Class 4, Class 5, or Class 6 aggregate.

Triple Lap means the coverage produced from the application of binder where the binder from each spray bar nozzle overlaps the binder application from the adjacent nozzle by two thirds.

304.05 MATERIALS

304.05.01 Binders

Binders shall be according to OPSS 1103.

304.05.02 Aggregates

Aggregates shall be according to OPSS 1006 and as specified in the Contract Documents.

304.06 EQUIPMENT

304.06.01 Pressure Distributor

The pressure distributor shall be designed and manufactured to spray binder on the road surface. The pressure distributor shall be capable of applying binder at the specified rates and in a continuous and uniform manner both longitudinally and transversely for a full lane width.

304.06.02 Mechanical Aggregate Spreader

The mechanical aggregate spreader shall be designed and manufactured to be self-propelled and capable of continuously and uniformly distributing aggregate at the specified application rate.

304.06.03 Rotary Power Brooms

Brooms shall be capable of cleaning gravel, sand, dirt, and other debris from the roadway surface.

304.06.04 Rollers

304.06.04.01 General

Rollers shall be ballasted according to the manufacturer's recommendations.

304.06.04.02 Steel Drum Rollers

Steel drum rollers shall be single drum vibratory rollers according to Table 1 and shall be operated in the static mode, if the drum is not rubber coated. Drive wheels shall not mark the aggregate.

304.06.04.03 Pneumatic-Tired Rollers

Pneumatic-tired rollers shall be self-propelled and be according to Table 2. The wheels shall be mounted with smooth tread rubber tires. Tire inflation pressure shall be a minimum of 350 kPa when the tires are cold. All tires shall have equal pressure. Each roller shall be equipped with a suitable tire pressure gauge for checking tire inflation pressure.

304.06.05 Pilot Vehicle

The pilot vehicle shall be equipped according to the requirements of the OTM, Book 7.

304.07 CONSTRUCTION

304.07.01 Operational Constraints

Surface treating operations shall not be carried out when the ambient temperature at the work location is less than 10 °C or where climatic or site conditions preclude the curing of the binder.

The application of binder and aggregate shall terminate one hour before sunset.

Surface treatment shall not be carried out prior to May 15th south of a line through Pembroke, Magnetawan, and Pointe au Baril Station or prior to June 1st north of the line.

Surface treatment shall not be carried out after September 1st except with the approval of the Contract Administrator. Surface treatment may be extended to September 30th provided a high float emulsion is used.

304.07.02 Sampling

304.07.02.01 Binder

The Contractor shall provide binder field samples for testing purposes as specified in the Contract Documents.

The work shall include sampling, labelling, packaging, and delivery of samples to the laboratory designated in the Contract Documents within 5 Business Days.

Each binder sample shall consist of a minimum size of two full 4-litre samples of material. The sample containers for emulsified asphalt binder samples shall be new triple tight cans. Sample containers shall be supplied by the Contractor.

304.07.02.02 Aggregates

The Contractor shall provide aggregate samples for testing purposes as specified in the Contract Documents.

304.07.03 Determination of Binder and Aggregate Application Rates

The application rate for the binder and the aggregate shall be as specified in the Contract Documents.

The Contractor shall demonstrate to the Contract Administrator satisfactory compliance to the specified application rates of binder and aggregate. At the Contract Administrator's option, this compliance may include a minimum 300 m one lane width trial section to ensure that the binder and aggregate are applied at the specified rate.

304.07.03.01 Acceptance of Binder Application Rate

The binder application rate is acceptable when the rate of application is within a tolerance of $\pm 5\%$ of the specified rate.

304.07.03.02 Acceptance of Aggregate Application Rate

The aggregate application rate is acceptable when the rate of aggregate application is within a tolerance of $\pm 10\%$ of the specified rate.

304.07.04 Surface Preparation

Existing bituminous surfaces shall be clean and free of all debris and standing water before application of binder.

Where a binder is to be applied on a granular surface, the surface shall be free of standing water and shall be prepared by dampening, fine grading, and compacting immediately prior to the application of the binder. The surface shall be finish rolled to ensure a compacted smooth and float free surface.

304.07.05 Binder Application Temperatures

Binder application temperatures shall be according to OPSS 1103.

304.07.06 Application of Binder

After the surface has been prepared, the binder shall be uniformly sprayed on the road surface at the specified application rate. When binder is to be applied to two adjacent lanes, the application of binder on the initial pass shall be done without the use of an end nozzle. When binder is applied to the adjacent lane, the nozzle positioned closest to the first application of binder shall be an end nozzle.

The spray bar height shall be adjusted to ensure that there is triple lap of the binder application. At the written request of the Contractor, the Contract Administrator may allow the use of a double lap application.

Longitudinal joints shall be constructed to ensure full coverage on the centreline.

The application of binder shall terminate at the same station for both lanes at the end of each day.

All roadway appurtenances within the area to be surfaced shall be properly covered and protected immediately prior to single and double surface treatment.

304.07.07 Application of Aggregate

Aggregate shall be uniformly applied at the rate specified. The distance between the pressure distributor and the spreader shall not be more than 30 m.

If excess aggregate is present when constructing a double surface treatment, the excess shall be removed prior to the second application of binder.

304.07.08 Rolling

Immediately after spreading, the aggregate shall be rolled with a minimum of two pneumatic-tired rollers. The entire treated area shall receive two passes from each pneumatic-tired roller.

When the surface treatment is placed on a prepared granular grade, one pneumatic-tired roller shall be replaced by a steel drum roller. The entire treated area shall receive two passes from the pneumatic-tired roller and one pass from the steel drum roller.

Rollers shall be operated at such a speed as to prevent aggregate pick-up, but in no case shall the speed of rollers exceed 10 km/h.

All rolling shall be completed within 300 m of the aggregate spreader. When the combination of rollers is not sufficient to maintain the completed rate of progress, additional rollers shall be used.

304.07.09 Traffic Convoy

When specified in the Contract Documents, the Contractor shall convoy traffic according to the OTM, Book 7.

The pilot vehicle shall guide one-way traffic through or around construction. The maximum speed of the convoy shall be 30 km/h. Convoying shall be maintained until such time as the surface treatment is able to carry traffic without damage.

304.07.10 Protection of the Work

The Contractor shall repair damaged areas until such time as the work has been accepted by the Contract Administrator.

Signs indicating fresh surface treatment, or similar wording, shall be erected at the project limits and any intersections throughout the project immediately after placement of surface treatment and shall remain in place for a minimum of 72 hours.

304.07.11 Management of Excess Material

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

304.09 MEASUREMENT FOR PAYMENT

304.09.01 Actual Measurement

304.09.01.01 Binder

Binder shall be measured for payment by mass in kilograms according to the requirements of the Contract Documents.

304.09.01.02 Class 1, 2, 3, 4, 5 or 6 Aggregate

304.09.01.02.01 By Mass

Aggregate applied to the road shall be measured in tonnes according to the requirements of the Contract Documents.

304.09.01.02.02 By Volume

Measurement shall be by volume in cubic metres, loose, by predetermined truck capacities. The predetermined capacity of each truck shall be that computed from its box dimensions.

Loading of each truck shall be kept to not less than the predetermined capacity. The Contractor shall not be required to load trucks in excess of this capacity to allow for bulking, and no deduction shall be made for any settlement of the load during transportation, provided that such settlement is not caused by spillage or leakage.

Each truck shall be uniquely and readily identifiable.

304.09.01.03 Traffic Convoy

The measurement for traffic convoy shall be in hours based on the number of hours that the pilot vehicle is convoying traffic.

304.10 BASIS OF PAYMENT

- 304.10.01 Binder "*type*" - Item**
- Class 1 Aggregate - Item**
- Class 2 Aggregate - Item**
- Class 3 Aggregate - Item**
- Class 4 Aggregate - Item**
- Class 5 Aggregate - Item**
- Class 6 Aggregate - Item**
- Traffic Convoy - Item**

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

Damaged areas requiring repair prior to the acceptance of the work shall be repaired by the Contractor at no extra cost to the Owner.

TABLE 1
Requirements for Steel Drum Rollers

Minimum Drum Diameter mm	Minimum Drum Width mm	Minimum Static Mass per mm of Drum Width kg
1500	2100	2

TABLE 2
Requirements for Pneumatic-Tired Rollers

Roller Class	Minimum Mass t	Minimum Mass per Tire kg
R1	8	900
R2	18	2500
R3	25	3600

Appendix 304-A, Commentary for OPSS 304, 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:

- Class of Aggregate required. (304.05.02.01)
- Frequency and type of QA testing required. (304.07.02)
- Location of laboratory for delivery of samples. (304.07.02.01)
- Application rate for the binder and aggregate. (304.07.03)
- Traffic convoy requirements. (304.07.09)

The following applications are available depending on traffic volumes, status of road, and type of road surface:

- Single surface treatment is typically applied to either a primed road, a roadway with a previously applied surface treatment, or a paved road.
- Double surface treatment is typically applied to either a granular base or a primed road.

For design estimating purposes, the following application rates may be used:

Treatment	Aggregate Type	Primer or Binder (Note 1)			Aggregate		
		Grade	Range kg/m ²	Typical kg/m ²	Class	Range kg/m ²	Typical kg/m ²
Prime	Class 4	Primer	1.90+/-	1.9	4	10-12	12
Single Surface Treatment	Class 1	CRS-2 or RS-2	1.65-1.90	1.8	1	14-17	16
	Class 2 (Notes 2, 6)	HF-150S	1.35-1.55	1.45	2	16.5-19	19
	Class 4 (Note 3)	CRS-2, HF-150S	1.20-1.40	1.3	4	8-11	11
	Class 5	CRS-2 or RS-2	1.15-1.45	1.3	5	11-13	13
	Class 6	HFMS-2(ON) or HFMS-2P(ON)	1.50-1.80	1.7	6	16-20	17
Double Surface Treatment	Class 2, Note 6	HF-150S (Note 4)	1.60-1.80	1.65	2	16-18	18
		HF-150S (Note 5)	1.45-1.65	1.5	2	16.5-19	19
	Class 3 & 1	CRS-2, RS-2 (Note 4)	1.60-2.10	1.9	3	15-18	17
		CRS-2, RS-2 (Note 5)	1.40-2.10	1.8	1	12-15	14
	Class 3 & 4	CRS-2, RS-2 (Note 4)	1.60-1.75	1.65	3	15-18	17
		CRS-2, RS-2 (Note 6)	1.05-1.20	1.1	4	6.5-8	8
	Class 3 & 5	CRS-2, RS-2 (Note 4)	1.80-2.00	1.90	3	15-17	17
		CRS-2, RS-2 (Note 5)	1.30-1.50	1.35	5	11-13.5	13
	Class 2 & 6	HFMS-2P(ON) (Note 4)	1.60-1.80	1.65	2	13.5-18	16
		HFMS-2P(ON) (Note 5)	1.50-1.70	1.60	6	15-19	16

Notes:

1. Decrease binder rates towards the lower limit of the range when there is heavy commercial traffic.
2. Class 2 surface treatment may cause dust problems in urban areas.
3. Do not apply to flushed surface treatments, flushed pavements or where low friction values are a concern.
4. Initial application.
5. Second application.
6. The use of Granular A aggregate in a Single or Double Surface Treatment is not recommended.

Appendix 304-A

If a granular grade is planned to be open to traffic for a considerable length of time prior to the surface treatment operation, the designer should consider including an item for surface restoration according to OPSS 301, Restoring Unpaved Roadway Surfaces.

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

None.