

**CONSTRUCTION SPECIFICATION FOR
COLD RECYCLED MIX
MIDLAND MIX PAVER**

CONTENTS

SCOPE

REFERENCES

DEFINITIONS

SUBMISSIONS AND DESIGN REQUIREMENTS

MATERIALS

EQUIPMENT

CONSTRUCTION

QUALITY ASSURANCE

MEASUREMENT FOR PAYMENT

BASIS OF PAYMENT

SCOPE

This specification covers the requirements for a cold mix paving process incorporating reclaimed asphalt pavement (RAP) from stockpiles. The process includes production and processing of RAP, design and testing, placement and compaction.

REFERENCES

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

Ontario Provincial Standard Specification, General:

OPSS 102 Weighing of Material

Ontario Provincial Standard Specification, Construction:

OPSS 309 Cold Mixed, Cold Laid, Open and Dense Graded Bituminous Pavement

Ontario Provincial Standard Specification, Materials:

OPSS 1102 Liquid Asphalt

OPSS 1103 Emulsified Asphalt

Ministry of Transportation, Ontario Publications:

MTO Laboratory Testing Manual

- LS-282 Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures
- LS-291 Quantitative Extraction of Asphalt Cement and Mechanical Analysis of Extracted Aggregate from Bituminous Paving Mixtures – Ontario Procedure
- LS-300 Preparation of Marshall Specimens for Cold-In-Place Recycled Mixtures

DEFINITIONS

For the purposes of this specification, the following definition applies:

Cold Recycled Mix (CRM): means a mix of processed RAP and asphalt emulsifier modifier produced through a cold mixing process.

SUBMISSION AND DESIGN REQUIREMENTS

Prior to commencing the work, for mix design purposes, the Contractor shall obtain RAP samples that are representative of the material to be processed.

The Contractor is responsible to design the mix to account for the variability of the RAP material. The asphalt modifier by mass of RAP shall be $2.0\% \pm 0.8\%$.

A minimum of 10 Working Days prior to the start of CRM operations, information on the type, manufacturer and supplier of the asphalt modifier, and a copy of the mix design and all calculations performed to determine the mix design shall be submitted in writing to the Contract Administrator.

MATERIALS

Reclaimed Asphalt Pavement

The processing operation shall ensure that 100% of the RAP aggregate passes the 26.5 mm sieve. The amount of RAP aggregate passing the 75 μm sieve shall not exceed 15% by mass. Adequate measures must be taken to manage the RAP source to ensure consistency and prevent contamination.

Asphalt Modifier

The asphalt modifier shall be an emulsified asphalt.

Emulsified asphalt shall meet the requirements of OPSS 1103 and be either a mixing grade polymer modified high float emulsified asphalt or a mixing grade high float emulsified asphalt, as specified in the Contract Documents.

EQUIPMENT

Production and Processing Equipment

Crushing or milling equipment, and screening equipment shall be used to generate and process the RAP to the size specified in the mix design. Crushed material shall be handled in such a way as to prevent re-compaction of the material before mixing takes place.

Mixing and Placing Equipment

A Midland Mix Paver or approved equipment shall be used for the mixing and placing of the Cold Recycled Mix. This unit shall be capable of producing a uniform thoroughly

blended CRM consisting of RAP and asphalt modifier. The RAP feed system to the mixing unit shall be equipped with a means of determining the mass of material being deposited into the mixing unit prior to the addition of the asphalt modifier. The mixing unit shall be capable of continuously maintaining the amount of asphalt modifier added within $\pm 0.2\%$ by weight of the RAP. All measuring devices shall be calibrated according to the manufacturer's specifications at the start of the Contract and whenever deemed necessary by the Contract Administrator. This unit shall be capable of placing the CRM with distributing augers capable of spreading the material evenly in front of the vibratory screed.

The asphalt modifier supply system shall be equipped with a flow meter and a total delivery meter.

Compaction Equipment

Appropriate compaction equipment shall be selected to achieve the required compaction.

CONSTRUCTION

Operational Constraints

The placing of cold recycled mix shall not be carried out when the ambient temperature is less than 10°C or when the overnight low is forecast to be less than 2°C. After September 30th written approval must be obtained from the Contract Administrator prior to CRM paving.

The placing of CRM shall be carried out when the roadway is free of water.

The wearing surface shall not be placed on the CRM mat until the following requirements have been met:

- a) the CRM mix has been allowed to cure for a minimum of 5 days
- b) the specified density has been achieved
- c) all defective areas in the CRM mat have been repaired to the satisfaction of the Contract Administrator.

The wearing surface must be placed within 14 Days once the CRM mat meets these requirements.

Compaction

The compacted CRM surface shall be uniform and satisfy the crossfall and grade requirements as specified in the Contract Documents. After compaction, the surface of the CRM mat shall be free from deviations exceeding 6 mm as measured in any direction with a 3 m straight edge.

The CRM shall be compacted to a minimum of 96% of the laboratory bulk relative density as determined by the submitted mix design, according to LS-300.

CRM which cannot be compacted to the required density shall be removed and replaced with new CRM.

After initial compaction, the CRM shall be opened to traffic and allowed to cure for a minimum of 5 days.

After initial compaction, a minimum of three samples of the compacted CRM shall be obtained by the Contractor, at random locations as determined by the Contract Administrator, for each full day or partial day of production. These samples shall be used for density testing.

Samples shall be removed intact from the pavement in sufficient quantities to carry out testing according to the MTO Laboratory Testing Manual. The samples shall be packaged to protect sample integrity, appropriately labeled, and delivered by the Contractor in good condition to the designated testing laboratory within 24 hours. If a sample condition is found to be unsuitable for testing by the laboratory, the Contractor will be notified immediately by the Contract Administrator to resample that location.

Protection of Work and Traffic Control

Traffic, including construction traffic, shall be kept off the freshly placed CRM mat until such time as it is able to carry traffic without damage.

Repair of Unacceptable Material

CRM material that is unacceptable due to Contractor workmanship shall be removed and replaced with CRM, at no additional cost to the Owner.

Traffic Control

The contractor shall be responsible for the preparation of a traffic management and control plan as per the Ministry of Labour's requirement (Book 7).

QUALITY ASSURANCE

Sampling of Asphalt Modifier

Samples of the asphalt modifier used in the mix, shall be obtained, labeled, properly identified and delivered within 5 Working Days of sampling to the Owner designated testing laboratory. Each sample of material shall be a minimum of two full 4-litre containers.

Samples shall be taken at the job site from each tanker load of material. Each sample shall be taken after a minimum of 4000 kg has been drawn from the tanker, from a sampling spigot on the transfer line, if available, or from the end of the transfer line.

The sample containers as supplied by the Contractor shall be triple tight epoxy lined pails or suitable leak proof plastic containers, which can be closed to prevent leakage. The sample labels will be supplied by the Contract Administrator.

Compliance

The supplied emulsified asphalt and liquid asphalt samples shall meet the requirements of OPSS 1103 and OPSS 1102, respectively, for the particular type and grade when tested in conformance to the designated test methods.

MEASUREMENT FOR PAYMENT

Actual Measurement

Cold Recycled Mix

Measurement will be in tonnes of RAP conforming to OPSS 502, including the asphalt modifier.

Plan Quantity Measurement

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

BASIS OF PAYMENT

Cold Recycled Mix – by the tonne

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

No additional payment will be made for the replacement of unacceptable materials due to Contractor's workmanship.