MAJOR PAVEMENT REHABILITATION PROJECT: REUSE OF EXISTING PAVEMENT MATERIALS

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ABSTRACT

The ministère des Transports du Québec (MTQ) increasingly relies on pavement material recycling techniques in its interventions on the highway system. The project presented is the result of research on recycling of pavement materials and on stabilization of granular materials with mixed binder (emulsion of asphalt and Portland cement). The results of this research have been transposed into specifications and contract clauses. The new standard NQ 2560-600 for recycled materials and the specifications prepared by the MTQ now allow better control of the use of recycled materials by specifying various aspects related to the properties of materials, quality control and the contractual requirements specific to this type of material.

A major rehabilitation project carried out in 2002 on the Autoroute Jean-Lesage, highway 20 at Villeroy (between Québec City and Montréal), is a good example of application of innovations resulting from research conducted at the MTQ over the past few years. This type of project is especially interesting in that it harmonizes with the residual materials reclamation policy set out in an action plan of the Ministère de l'Environnement du Québec in 1998 with the aim of reducing the disposal of this type of residue in dry material disposal site.

The project, 4.7 km in length, consisted of developing a granular material from the existing pavement, consisting of a cement concrete slab (14 cm to 16 cm thick) under an asphalt pavement (18 cm to 24 cm thick). Part of the existing granular base course was also recycled. Each layer was removed and crushed separately for mixing plant production of the recycled material. Over 50 000 t of recycled materials were produced and used as base course.

The materials were tested before construction to determine the intrinsic characteristics (Los Angeles and micro-Deval), manufacturing characteristics (grading and binder content) and complementary characteristics (impurities, amount of fines, amount of reclaimed concrete and asphalt pavement in the recycled materials, organic matter content, water-soluble chlorides and sulfates). The grading and composition of the recycled materials were also tested on site.

The recycled materials stabilized with mixed binder (emulsion of asphalt and cement) were the object of test bed acceptance and acceptance on site with regard to the dry and retained Marshall stability after immersion in water at 22 ˚C and in terms of percentage of residual asphalt, bulk density and maximum mixing percentage. The materials proved to conform before and after construction.

The pavement design is based on a first life cycle of 20 years and provides an expected traffic of $38x10^6$ ESAL. FWD deflection readings taken after the work confirmed the achievement of the initial objectives set during design. The total deflection (Do) and the curvature index (SCI) on the test section are slightly lower than the acceptable deflections set during structural dimensioning, or respectively 201 µm and 45 µm. These results indicate that the values used to characterize the mechanical properties of the residual materials during structural design are realistic and representative (ref. CHAUSSÉES software of the Direction du laboratoire des chaussées). The distress reading of this pavement, constructed in 2002, should help designers in devising long-term performance criteria.