Technical Circular T-04/26
August 20, 2026

To: All Engineering Directors
All Regional Directors
All HQ Directors: Operations, Planning and Major Projects
All Directors and Managers, Provincial Field Services
All Managers and Supervisors, Structural Construction Services

Subject: Use of Reclaimed Asphalt Pavement in Construction and Paving Projects

1.0 Purpose:

This T-circular outlines best practices and requirements for the use of Reclaimed Asphalt Pavement (RAP) in Construction and Paving Projects. This technical circular supersedes technical circular T-05/17.

2.0 Background:

Reclaimed Asphalt Pavement (RAP) is produced by milling or grinding existing asphalt pavement surfaces and is regularly generated in Ministry resurfacing and construction projects. It is important to recognize the value of this product when it is used appropriately as part of a new pavement mix, as surfacing in low traffic areas and as improvement to the upper base gravels of a pavement structure.

3.0 Policy:

- The decision to use RAP in rehabilitation and grading projects should be carefully weighed to ensure that it is used in a manner that will take full advantage of its residual asphalt binder and quality of aggregate material.
- RAP stockpiles should be placed on an impermeable surface where possible, not placed within 30m of a designated stream and follow the requirements of SS505-A.06 RAP Stockpiling.
- Stockpiling of RAP in Ministry pits or quarries must be approved by the Ministry's Regional Aggregate Manager.

4.0 Guidelines for use of RAP

Project staff involved in use of RAP should familiarize themselves with following documents as applicable:

- T-Circular on Pavement Structure Design Guidelines;
- Standard Specifications Section 502 (Asphalt Pavement Construction – EPS);
- Standard Specifications Section 505 including appendix 505-A (Use of Reclaimed Asphalt Pavement in Asphalt Pavement Construction); and
- Standard Specifications Section 511 (Cold Milling) and Section 952 (Contractor Supply Asphalt).

The following guidance is provided with respect to potential ways to incorporate project-generated RAP in the most useful, cost-effective manner in new paving and construction. Options are listed in order from the most to least value-added use of RAP:

5.0 Incorporating High Quality RAP in Asphalt Concrete Mix Designs

RAP usage shall meet the requirements of SS 505. The maximum RAP allowed in the asphalt mix shall follow the requirements of SS 505.04.

If RAP is left in stockpile for more than one to two years, there will likely be additional costs to process the material. The responsibility for these additional costs should be clearly defined in Ministry Construction Contracts.

6.0 RAP as a Surfacing Material on Low Volume Roads

The most common use of RAP for a low volume roadway is to have RAP mixed cold with a rejuvenating agent in a plant or pugmill, then cold-paver-laid (or straight cold-paver-laid and surface-sprayed with a rejuvenator) and compacted on a side road, highway pull-out, or rest area, or other suitable low-traffic location. This treatment is not recommended for locations with heavy loads, concentrated haul and steep grades (typically over 6%) due to raveling and other failure concerns.

The resulting asphalt pavement from the cold mix process leaves a pavement-like surface with the following properties:

- Moderate open texture.
- Sufficient density to support lighter traffic without sustaining damage; and
- Low-enough density to prevent or minimize temperature-related cracking.

Cold RAP pavements require strong base/sub-base support and should not be used on pavements with inadequate gravel and/or base structure.

When a cold RAP pavement surface starts to ravel (typically after 2 to 10 years of use, depending on traffic and weather conditions), either a sealcoat or thin pavement overlay (37.5mm to 50mm) can be placed over it to significantly extend road surface life.

7.0 Incorporating RAP into Pavement Structure by Pulverization

7.1 Introduction

An efficient way to use RAP in a pavement structure through an in-situ process is by means of pulverizing (road reclaiming) where the existing pavement is:

- Ground up/pulverized in-situ resulting in a blend of fractured RAP pieces and combined with an underlying base granular aggregate; then
- Compacted to provide a RAP/granular aggregate blend on which a new pavement or a granular layer can be placed as applicable for the project.

7.2 Restrictions for incorporating RAP into pavement structure by pulverization

- Pulverizing to incorporate RAP into an existing pavement structure requires careful evaluation of existing pavement structure and site conditions because of the potential for variability of in-situ material thickness and material properties which may lead to long term performance risks.
- Written approval from the Ministry in consultation with the Senior Materials and Pavement Engineer, Regional Paving Manager and Field Services is required before using pulverization treatment for projects on numbered highways. The approval is at the discretion of the Ministry and is subjected to detailed analysis of individual project conditions.

7.3 RAP aggregate blend for pulverization

- The pulverized pavement is generally intended to consist of an even 50/50 mix of reclaimed pavement and underlying granular aggregate. However, this ratio is only a target and may not be achievable in all cases due to site-specific conditions, such as the relative thickness of existing asphalt and available granular material. The acceptable proportion of pulverized pavement shall range between one-third (30/70) to two-thirds (65/35) of the total blend to accommodate varying conditions.
- Where necessary, additional virgin aggregate may be imported and incorporated to achieve a suitable and well-balanced mix. The final blend proportions are usually determined through laboratory testing to ensure the selected mix provides optimal performance.
- Where pulverizing is not an option, RAP generated by milling may be stockpiled on or off site, then blended with granular aggregate and placed and compacted as a granular layer. The RAP should be blended only with virgin aggregates that meet the quality requirements of Well Graded Base (WGB) in SS202. Further, the blending should be carried out using a pugmill (cold feed system) if uniform blending of materials is not possible on site. The proportion of blend shall be as mentioned above. Use of pugmill is preferred method over on-site mixing using a grader or other similar equipment. This option is also subjected to restrictions in section 7.2 above.
- The blended material that is stockpiled for 1-2 years or longer, particularly in warm weather, may harden and require recrushing and rescreening before it can be incorporated into granular layer applications in the pavement.

7.4 Design and operations considerations for incorporating RAP into Pavement Structure by Pulverization

- RAP can contain up to 6% asphalt binder and can reduce the permeability of any granular aggregate it is blended with. Accordingly, if the percent RAP in the blend exceeds 50% or the fines content (0.075mm) exceeds 5%, there is risk of compromising the pavement drainage. In such cases, the location for a RAP/granular aggregate blend shall be at the top of the pavement structure granular layers. (i.e., in the granular base course layer directly beneath the asphalt pavement layer).
- RAP (either by itself or blended with granular aggregates) shall not be allowed to be inserted/placed anywhere in the pavement structure where either vertical or

lateral drainage will be compromised (i.e., between the sub-base and base layers or other layers which would then reduce permeability of those layers).

- Pulverizing work should be carried out using equipment capable of breaking down and uniformly blending the existing pavement to the specified depth.
- Pulverizing should not be used for locations with shallow utilities or drainage structures within 300mm of proposed pulverization depth.
- Pulverizing should not be used for roadways with material under the existing asphalt concrete that contains aggregates greater than 75mm. Large particles can cause damage to the pulverizing equipment's grinding teeth.
- Pulverizing shall be limited to a depth of 300mm to allow for proper blending and compaction even though pulverization equipment can pulverize up to a depth of 450mm. Slower speeds of pulverization equipment or multiple passes may be required to achieve homogenous blending and adequate compaction depending on the type of existing material, equipment used and pulverizing depth.
- For typical asphalt concrete pavement thicknesses of 150mm or less the depth of pulverizing should be adjusted to achieve the optimal 50:50 RAP/granular aggregate blend.
- Pulverizing can be achieved on asphalt layers of up to 200mm in thickness however pulverizing asphalt concrete pavement layers thicker than 150mm reduces the amount of granular aggregate in the final pulverized product.
- Milling drum operation shall be adjusted, including forward speed, drum rotational speed, and rear door position, where existing asphalt pavement exhibits extensive alligator cracking. Failure to make such adjustments may result in the pavement lifting or breaking into large fragments, producing oversized RAP material and potentially causing deficient gradation and compaction.
- Asphalt coring shall be performed prior to pulverizing at locations where significant variation in existing asphalt concrete pavement and base course depth is known or suspected. Ground Penetrating Radar (GPR) can also be used in conjunction with coring to identify existing pavement structure layer thicknesses. Clear coordination should be maintained between the Ministry, Contractor, and Engineer of Record to ensure the pulverization/blending process is adjusted appropriately for the project.
- Even without adding new material, compacted pulverized material typically swells from 5 to 10% relative to the original material. This volume change needs to be considered at planning and design stage.

7.5 Quality Control of Pulverized/Blended Product

- The resulting Pulverized Base Materials from the pulverization process shall be a homogeneous mixture, free of lumps, with a gradation where 100% passes the 37.5mm sieve and 95 percent passes the 25mm sieve. For sieve analysis only these two sieve sizes should be used instead of the full set of sieves. Multiple passes of the pulverization equipment shall be performed if this gradation requirement is not met with one pass.
- Compaction control should be done using the target density approach specified in the Special Provisions document for the project.
- Compaction equipment shall, at a minimum, include a smooth single drum vibrator roller and a pneumatic tire roller, all with static mass of 15 tonnes or more.

- Minimum frequency of testing shall be 20 random locations at varying offsets from centerline per lane kilometer for each material used.
- Spreading and placing of the pulverized material shall be accomplished by a motor grader such that the required compaction is attained for the full pulverized depth. Pulverized Base Material shall be compacted in a thickness no greater than 150 mm.
- The Contractor shall ensure the crossfall of the finished surface of Pulverized Base Material mirrors the finished roadway surface, including crown and superelevation of 2% unless otherwise directed by the Ministry Representative.
- Prime coat shall be applied prior to paving on top of the pulverized base layer.
- Quality control testing of the in-situ crushed base course aggregate can be carried out before pulverizing and the results used as an "indicator" of the quality of the RAP/gravel blend.

7.6 Full/Partial Depth Recycling of the Pavement Structure

- Full depth and partial depth recycling for the existing pavement structure can be done using stabilizing agents such as foamed asphalt, asphalt emulsions, etc.
- This type of recycling strategy requires site investigation, review of the existing pavement structure, drainage conditions, traffic configuration, volume analysis etc. It can require in-situ materials testing and a formal pavement structure design depending on the project complexity and site-specific conditions.
- Full/partial depth recycling on a project requires the review and approval from the Ministry's Senior Materials & Pavement Engineer in consultation with Regional Paving Manager and Field Services.

8.0 Using RAP for Shoulder Build-Up or Shouldering

Pure unblended RAP can be used directly for shoulder build-up beneath a new shoulder pavement where it doesn't impede the lateral pavement structure drainage.

RAP blended with shoulder aggregate can be used for shouldering after paving; typically, this blend is much more stable (less prone to sloughing and erosion) than straight shoulder gravel. Blending ratio can be similar to the ratio mentioned in section 7.

9.0 Using RAP as a Fill Material

This is the lowest-value application for RAP use and can make sense where there are no other anticipated uses (distant location, no storage sites, no side roads, etc.) for the RAP material.
RAP when used as a fill material is placed or mixed as low as possible in the subgrade where it will least impede drainage from the grade. Coarsely graded RAP can be used as the embankment base. When used as embankment base material, the maximum particle size shall be 400mm.

Environmental considerations for use of RAP as fill material

- RAP shall be placed only in neutral or alkaline soils and properly compacted.
- RAP shall not be placed:
    - below the seasonal high-water table elevation;
    - below the 1 in 200-year flood elevation;
    - Within 30m, measured horizontally, of;
        i. the seasonal high-water mark of any Designated Stream;
        ii. the edge of any Environmentally Sensitive Area (ESA), or;
        iii. any drinking water well or intake.

EXAMPLE: MUTIPLE USES FOR RAP MATERIAL IN A SINGLE PROJECT:

This example is a construction project that requires total removal of existing pavement (250mm thick asphalt pavement). The top 50mm of asphalt pavement is known to be high-quality (from a 12-year-old overlay), while the bottom 200mm is of variable quality:

1. The top 50mm of asphalt pavement is milled off first, taken to the asphalt plant site and set aside in stockpile for future blending into new pavement mixes (see step 4 below).
2. The next 100mm of asphalt pavement is milled off, and half is used for cold-paver-laid side roads surfacing on a nearby project and half is saved to blend with gravel (at a 50/50 ratio) for shouldering material (step 5).
3. To achieve grade and improve base strength, 100mm of new base course aggregate is placed over the remaining 100mm of AP and then pulverized/blended in place to a depth of 200mm (yielding a 50/50 RAP/gravel blend).
4. Following grading and compaction of the pulverized base layer, two 62.5mm-thick lifts of new asphalt pavement are placed (bottom lift with 30% RAP, top lift with 15% RAP) to complete the pavement structure.
5. The shouldering gravel/RAP blend is then placed and compacted to finish the shoulders.

All RAP generated on this project is used in a manner which optimizes its value.

Questions regarding use of RAP or the implementation of these guidelines should be addressed to the Senior Materials and Pavement Engineer.

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