

Use of Recycled Materials in Rail Projects

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As part of the *Waste Avoidance and Resource Recovery Strategy 2030*, PTA took action to update specifications to facilitate more use of recycled materials/innovative products including practical targets

Crushed Recycled Concrete (CRC)

- Road subbase
- Road basecourse
- Rail access roads
- Sub-ballast capping
- Infiltration - drainage

Recycled Asphalt Pavement (RAP)

- Intermediate asphalt layer
- Asphalt wearing course

Recycled materials in updates included (2)

Crumb Rubber binder / seal

- Bituminous road seal
- Asphalt wearing course

FOGO Derived Mulch / composts

- Project mulch in landscaping
- Soil Conditioner / topsoil

Recycled and Manufactured Sands

- Trench backfill and general fill

Crushed Recycled Rail Ballast (CRRB)

- Rail ballast
- Crushed for road base and subbase
- Infiltration – drainage
- Blended in fill embankments

Low carbon and geopolymer concretes

Recycled Plastic

- Drainage pipes

- Any location covered by full depth asphalt pavement;
- Local access roads with CRC as a subbase with a minimum 100mm crushed rock base (CRB) with a primed surface, an S35E seal and a crumb rubber modified binder (CRMB) dense graded asphalt.
- Local access roads with CRC as a subbase and basecourse with a primed surface, a strain alleviating membrane interlayer (SAMI) and a CRMB dense graded asphalt.
- Carparks with CRC as the basecourse constructed as a 200mm minimum layer with a primed surface, a SAMI seal and a CRMB dense graded asphalt.

CRC – Carpark Applications



CRC – Carpark Applications (2)



CRC Requirements for Constituent Materials

Table 4: Limits of Constituent Materials

Material	Min. Limits (%)	Max. Limits (%)
Crushed Recycled Concrete (subbase and base)	55%	95% ¹
Crushed recycled granite road base (CRGRB), natural gravels PI<10% recovered from road pavements (base)	N/A	45%
Crushed recycled granite road base (CRGRB), gravels and limestone recovered from road pavements (subbase)	N/A	45%
Crusher residue from manufacture of concrete aggregates	N/A	45%
High density fired clay brick and tile (subbase) ²	5%	45%
High density fired clay brick and tile (base) ²	5%	20%
Other foreign materials	In accordance with Table 5	

CRC Requirements for Foreign Materials

Table 5: Limits of Foreign Materials

Material	Limits (%)
Asphalt (as opposed to RAP) ³	15% (sub-base) 10% (base)
Low density materials (plastic, plaster, low density brick etc.) retained on 4.75mm sieve	1.5% (sub-base) 1.0% (base)
Organic matter (wood etc.) retained on 4.75mm sieve	1.0% (sub-base) 0.5% (basecourse)
Unacceptable high-density materials (inert metals, glass and ceramics) retained on 4.75mm sieve	3% (sub-base) 2% (basecourse)
Aluminium as a metal (non-oxidised)	0.001%
Asbestos and other hazardous materials	In accordance with DWER Roads to Reuse Specification

- Required where CRC used as a basecourse and covered with asphalt
- Seal not required where used as a sub-base layer

Commonality with AfPA/IPWEA and Main Roads Specifications

Table 10: Amount of RAP to be used in Asphalt

Asphalt Mix	Amount of RAP to be Used
7mm dense graded laterite for paths	Not to be used
10mm dense graded laterite asphalt for bus lanes	Not to be used
10mm dense graded asphalt with CRMB	0 – 10 Asphalt supplier can include RAP if the mixture has adequate workability to achieve shape and compaction
14mm intersection mix (C320 bitumen or A15E binder)	5 – 15%
14mm intermediate course asphalt (A15E binder)	5 – 15%
20mm intermediate course asphalt (C600 bitumen)	10 – 25%

- Crumb Rubber Modified Binder (CRMB) shall be used in a 10mm dense graded granite asphalt for carparks or local access roads.
- Use of CRMB in 7mm dense graded laterite asphalt for a path or shared path may be invited by PTA as a trial with mix details in MRWA specification – Supplement for Trial Mixes.
- The asphalt shall be manufactured with S15R modified binder (formerly S45R).

Thank you



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