



Design and Construction using Crushed Recycled Concrete on Local Government roads in WA

Reference: LG TRRIP 05

Published: September 2024

These documents have been prepared to support increased use of crushed recycled concrete in local government roads in Western Australia, increasing the use of recycled materials and helping to achieve the requirements of the Waste Avoidance and Resource Recovery Strategy (WARRS) 2030.

Background

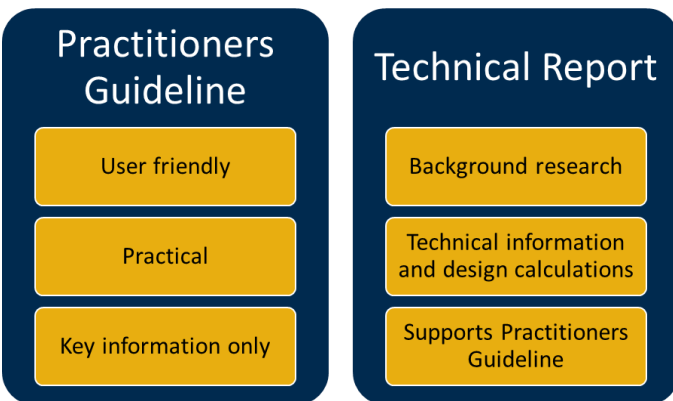
In recent years there has been an increase in the use of recycled materials such as crushed recycled concrete (CRC) for pavement construction. In particular, the Roads to Reuse program has been developed to encourage increased use of recycled materials and ensure that recycled products meet a product specification designed to protect human health and the environment.

Increasing the use of CRC will help to achieve the current WARRS goal of increasing Construction and Demolition sector material recovery to 80% by 2030.

However, CRC has unique properties that need to be understood, and it can vary in engineering properties depending on the material's source. These documents have been prepared to assist local government practitioners when specifying CRC, and increase industry knowledge and confidence in the product.

Approach

Two key documents have been prepared:



The Practitioners Guideline was prepared in a user-friendly format intended to be used by practitioners with limited technical expertise in pavement design and construction.

The Technical Report contains supporting background information and does not need to be referred to unless further information is sought.

Stockpile of recycled road base



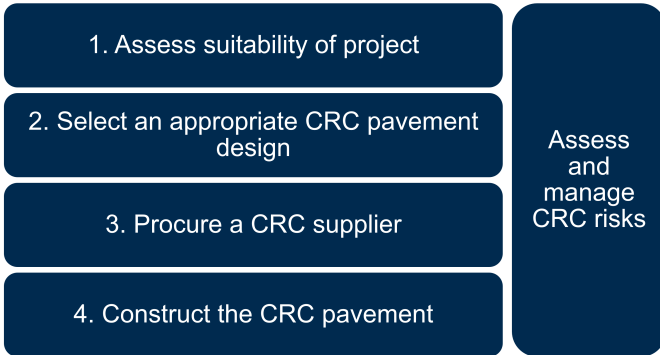
Source: Waste Authority WA (2020)

Development of the documents included a literature review of case studies, reports and specifications, development of typical CRC pavement design sections, plus separate consultation sessions with practitioners and industry representatives.



Findings

The key outcome of the project was the development of a procedure to assist practitioners in selecting appropriate projects for CRC, and once a project was identified, walking them through the steps required to assess, develop and construct a CRC pavement.



Practitioners will need to identify a suitable project for use of CRC and assess whether any Roads to Reuse incentive payments apply. Consideration will need to be given to the risks associated with CRC use, and the Practitioners Guideline provides simple guidance to help practitioners identify cases where CRC may or may not be appropriate.

Once a suitable project has been selected, a decision on the pavement layers to be constructed using CRC needs to be made, and the Practitioner’s Guideline also provides assistance to facilitate sound decision making.

The most practical finding practitioners should be aware of is that CRC can be used as a like-for-like replacement for pavement sub-base layers in almost all situations with very low risk.

Compacted CRC sub-base



Source: Ben Harvey (WSP)

If CRC is used as basecourse then there are additional risks that need to be considered, such as block cracking and the occurrence of surface blisters or domes. All of these risks can be managed with appropriate selection and design of CRC pavements, and the Practitioner’s Guideline clearly explains the risks associated with CRC and what options are available to manage each one.

The majority of the Practitioners Guideline focusses on selection and design of an appropriate CRC pavement profile, including whether to include a crack mitigation layer to help manage the risk of block cracking (only a risk if CRC is used as basecourse). Several options are provided to allow practitioners to select the most appropriate option for their project.

Further advice is also presented to help practitioners procure a CRC supplier, and advice on construction specific to CRC pavements is also provided.

References

Waste Authority of WA (2020), Roads to Reuse pilot project, Waste Authority of Western Australia, November 2020.

How does this research change the way we think?

CRC should be the first choice for pavement sub-base in almost all local government construction projects. Alternative materials should only be considered if CRC has been deemed unsuitable.

A number of practitioners have limited experience with CRC and may not fully understand the risks associated with this material. Empowering local governments with the knowledge to better understand the behaviour of CRC will facilitate increased use of the material and reduce the occurrence of issues.

When sourced and produced in accordance with appropriate specification requirements, CRC is a high-quality pavement construction material.

Increasing the use of CRC will help to develop a circular economy for this material in WA and achieve the requirements of the Waste Avoidance and Resource Recovery Strategy 2030, which has a target of 80% material recovery for construction and demolition (C&D) waste (which includes CRC) by 2030.