DESIGNPAVE

CMAA's DesignPave program has been developed in collaboration with the University of South Australia to design and analyse concrete segmental pavements (CBP). It is a successor to CMAA's longstanding LockPave program which was first launched in the 1990's. For over two decades LockPave has proven its worth as a tool to assist designers with their concrete segmental pavement design.

DesignPave incorporates a simplified interface to intuitively guide users through the pavement design process.

It employs the Method of Equivalent Thickness methodology to compute the most appropriate design for the identified pavement loading and soil conditions.

The latest update to DesignPave includes a newly hydrological methodology to design Permeable Pavements, which allow rainwater to infiltrate the ground below. The software incorporates new knowledge and technology developed by the industry and research sectors.

The program can be used for both residential and industrial pavement applications.

Features of DesignPave

- Integrated help files to guide users through the pavement design process
- Design charts are generated to visually analyse the thickness designs
- Ability to save and resume the project
- Cost analysis
- Professional report generation
- Analyse existing pavement structures for stability
- Flexibility to select and compare between various
- Design methods (Industrial option only)
- Flexibility to compare between various pavements layers to efficiently determine the most economical option for the project
- Save project time- DesignPave will compute the most appropriate design for your CBP!

What's New?

The newly developed hydrological methodology supersedes the method used in the previous PermPave program. PermPave has now been integrated into DesignPave, this allows users to design either a permeable or impermeable hard-standing pavement.

New Additions

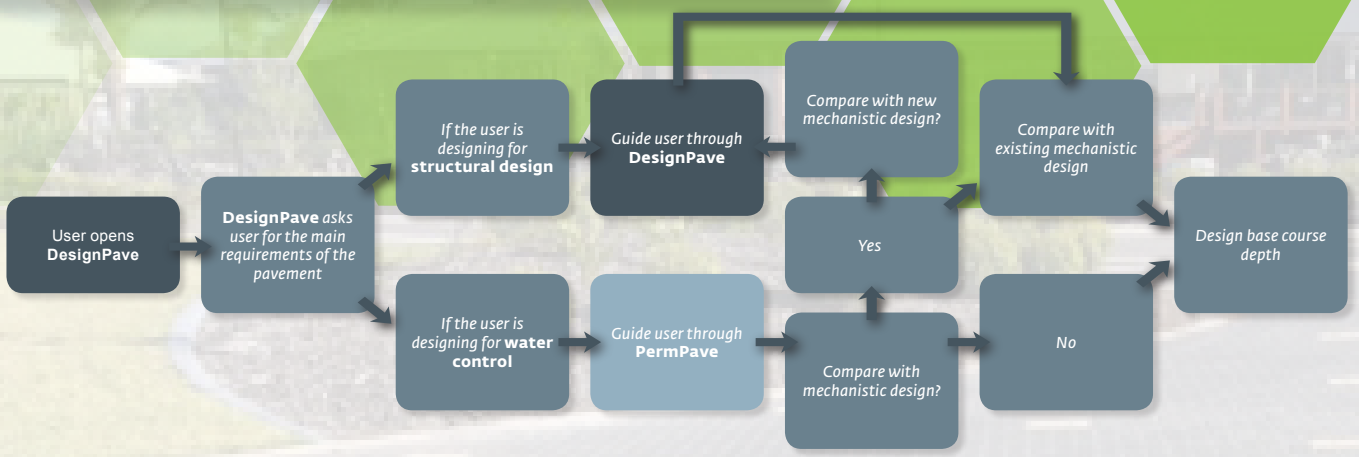
- First credible permeable pavement design software in Australia – available for FREE
- Ability to design for Flood Control, Water Quality or Water Harvesting
- Latest city rainfall intensity and temporal distribution data for Flood Control Projects
- Ability to insert location specified rainfall data from the Bureau of Meteorology
- An updated water quality model
- User Specified Rainfall data
- Option of Choosing between ARR 2016 or ARR 1986
- Manual calculations for various parameters for sub-base and soil coefficients
- Option to compare the hydraulic design with a mechanistic design

Pavement Design

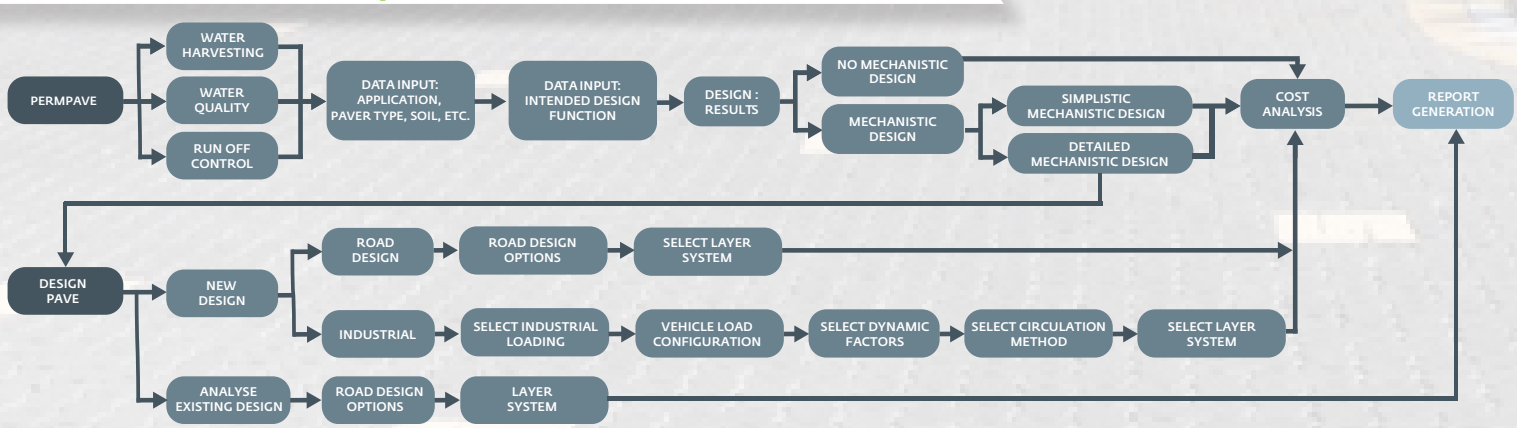
DesignPave is a program which facilitates the user's customisation of their pavement design at the top layer. As such, users are able to choose from a diverse selection of paver unit types, basecourse materials and intended application of the pavement.

Depending on the intended application of the pavement, certain paver type options may be made unavailable of the software due to its unsuitability.

Program Overview Flowchart



Functionality Overview Flowchart



Features Overview

Objectives Of Analysis

Users are given a choice to select what the primary objective of the pavement design will be. The independent design streams will be:

- *Mechanistic Design*
  - *Road - Pavements consisting of residential and minor streets, local roads and the like; and*
  - *Industrial - Pavements designed for high capacity surfaces that carry significant loads. i.e. Airports and storage yards.*
- *Hydraulic Design*
  - *Runoff control – Runoff control through either infiltration or storage;*
  - *Water Quality – Effluent quality control to ensure local water quality requirements are met; and*
  - *Water harvesting – Storage of rainwater intended for re-use later.*

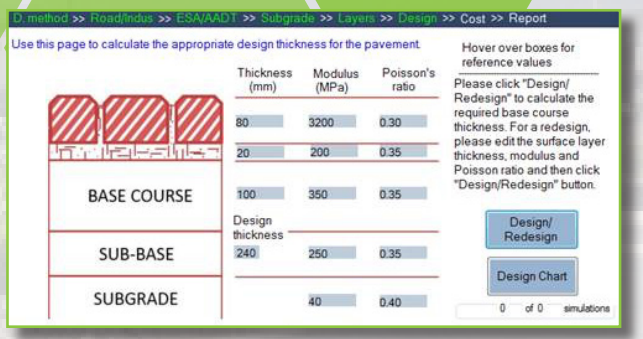
Cost Analysis Feature

Users can compute the estimated total cost of the project based off the determined design thickness. Simplifying the cost benefit analysis of the project to find the most appropriate solution.

Report Generation

Users can generate a CMAA branded report after finalising their design. Users can customise their report by selecting from a list of options. Options include: design chart, pavement design details, cost analysis, design methodology and figure of pavement layer system.

Thickness Calculations



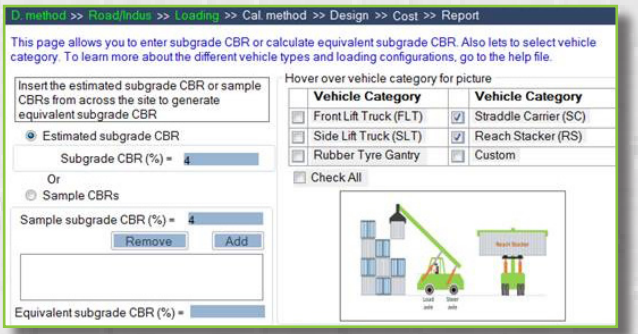
Based off the specified material characteristics and anticipated loading conditions, DesignPave computes the most appropriate design thickness using the Method of Equivalent Thickness (MET). The MET converts a multi-layer system into a single homogenous system such that all the layer systems are given an equivalent modulus.

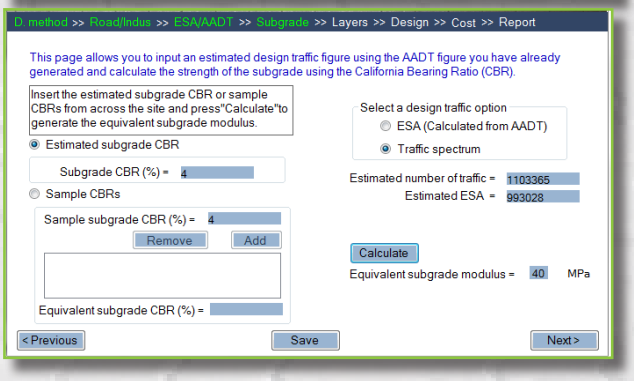
For an industrial pavement, DesignPave allows further customisation by allowing the user to select from three different pavement design methodologies, each appropriate for differing base course materials. The design methodologies include:

- Miner's rule (industry recommended method) – Using Miner's rule, the total estimated design traffic over the pavement's service life is distributed according to the inputted traffic survey data.
- Single equivalent wheel load (SEWL) method – The SEWL method converts all individual wheel loads into an equivalent wheel load to calculate the damage fraction of the pavement.
- British ports method – Designs using Knapton's method are based on a design chart for a standard cement bound granular material (CBGM) with a tensile strength of 1.18 N/mm2. The thickness of the base course will be dependent on the total equivalent number of repetitions and maximum wheel load.

Loading Conditions

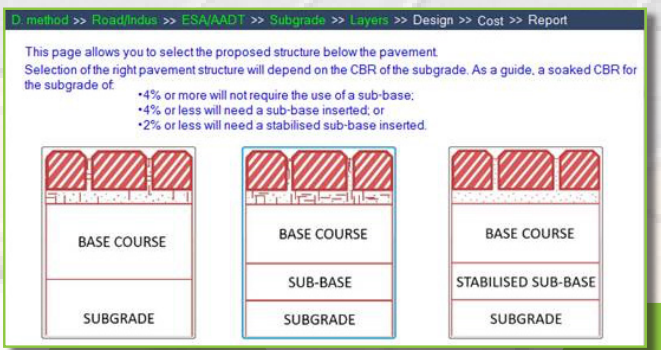
DesignPave allows users to define their own material properties and loading conditions. For residential applications, users can define an approximate Equivalent Standard Axle (ESA) or allow the program to compute it using the Annual Average Daily Traffic (AADT) data. For industrial applications, users are required to define the loads and configurations of common and/or custom industrial vehicles. Users are also able to factor dynamic loading conditions including braking, cornering, acceleration and uneven surfaces. DesignPave then automatically computes the axle loads based off the identified vehicle geometry and container weight.





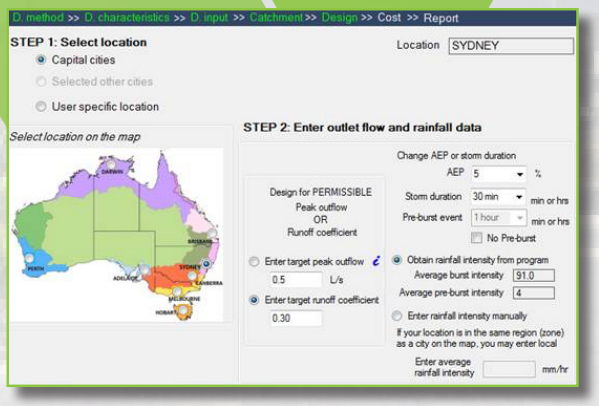
Layer System

Users are flexibly able to select from and experiment between three pavement layer systems. DesignPave recommends which option is most suitable based on the inputted ESA and subgrade CBR values.



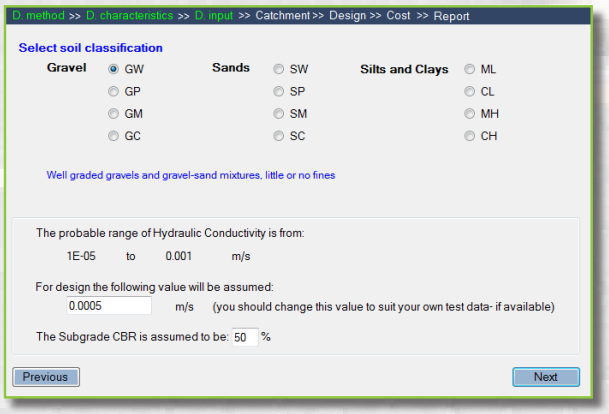
Australian Rainfall & Runoff Data

DesignPave offers users two sets of Australian Rainfall & Runoff (ARR) Data to use. Both sets of data have been generated by the Australian Bureau of Meteorology. The 1987 ARR data estimates rainfall intensity considering rainfall frequency and duration, providing a single rainfall temporal distribution. The 2016 ARR data is based on an extra 30 years of additional rainfall data, more accurate estimates, combining contemporary statistical analysis and techniques with an expanded rainfall database. The 2016 ARR data considers pre-burst rainfall intensity/ distribution and considers 10 rainfall temporal distributions.



Soil Classification

Users are able to classify their soil type under the Unified Soil Classification System (USCS) as gravel, sands, silts, clays and a soil grading. A default soil infiltration rate is provided.



Infiltration Options

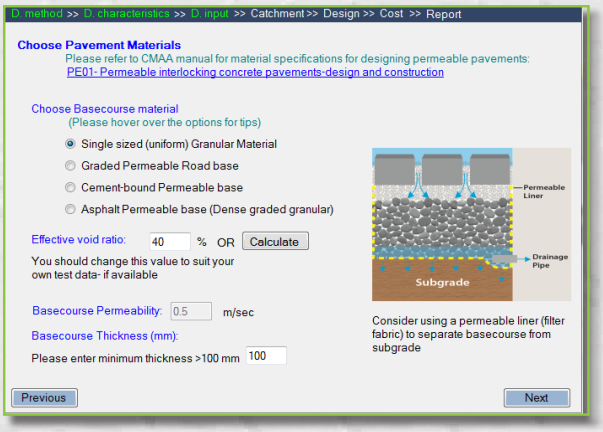
Users can design for three options:

Full Infiltration - All storm water is subject to infiltrate the subgrade to leave the permeable pavement system.

Partial Infiltration - infiltration mainly occurs through conventional drainage pipework however, some infiltration occurs through the subgrade.

No infiltration - No water is permitted to drain through the subgrade. All infiltration is to occur through the drainage pipework.

Users should determine which infiltration option is most appropriate based on soil conditions and soil infiltration rate.



Catchment Area Characteristics

Users can assign contributing catchment characteristics to their permeable pavement design. Users can either select no contributing catchment where only rainfall falling on the permeable pavers will be drained. Or users can design for a contributing catchment that takes into consideration both rainfall falling on the permeable pavers and impervious surrounding areas that will also drown into the permeable pavement system.