PERMCON

CONTINUOUS POUR PERMEABLE CONCRETE PAVING SYSTEM

INSTALLATION GUIDE

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PERMCON.CO.NZ

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WHAT IS PERMCON?

Permcon is a continuous-pour permeable concrete system designed to manage stormwater on-site, reduce runoff and support groundwater recharge. Unlike standard concrete, Permcon has a high void content (typically 20-25%) that allows water to pass through the slab and into the ground below.

This makes it ideal for areas where stormwater management, land-use efficiency and environmental performance are important.

How It Works

The open structure of Permcon allows rainwater to:

- Soak through the concrete, reducing surface runoff.
- Filter out pollutants before water enters waterways.
- Recharge groundwater naturally – mimicking undeveloped land.

This reduces the need for stormwater pits, tanks or rain gardens – and adds flexibility in site design.

Properties

- Infiltration 8,000 - 10,000mm/hour.
- Compressive strength to 25MPa.
- Slip resistance P4 0v.45 - 0.54 BPN.
- Run-off coefficient 0.3.

Installer Note

This guide covers how to install Permcon's permeable concrete system correctly and safely. Always work in consultation with a qualified engineer, architect or landscape architect to ensure compliance with:

- Local council rules.
- Regulatory requirements.
- Site-specific design conditions.

Important: Only trained and accredited installers should carry out installation of the Permcon system.

BENEFITS

Permcon delivers practical and environmental advantages across a range of project types.

+ REDUCES RAINFALL RUNOFF

With a runoff coefficient of 0.3, Permcon eases pressure on stormwater systems.

+ RECHARGES GROUNDWATER

Water filters through the slab and returns to the aquifer, just like in a natural landscape.

- CONTROLS PEAK STORMWATER FLOWS

Detains water in the base layer and releases it slowly.

+ IMPROVES WATER QUALITY

Filters out up to 70% of heavy metals, hydrocarbons, organic debris and suspended solids.

+ PROTECTS SOIL HEALTH

Allows water, air and nutrients to pass through to the underlying soil, maintaining the conditions needed for life to thrive below the surface.

- REDUCES SIZE OF RETENTION STRUCTURES

Stores water within the pavement system, freeing up usable land.

- REDUCES RUNOFF TEMPERATURE

Helps protect rivers, streams and aquatic ecosystems from temperature spikes.

+ MAXIMISES SITE USAGE

In passive systems, Permcon may be considered equivalent to grass for design purposes.

PERMCON BENEFITS EXPLAINED.
SCAN QR CODE TO WATCH OUR VIDEO.

TERMINOLOGY

WEARING COURSE The Permcon permeable concrete layer. Thickness depends on the application.

PERMEABLE BASECOURSE An open-graded aggregate that supports the wearing course and stores stormwater.

EXTENDED PERMEABLE BASECOURSE A deeper layer of open-graded aggregate, used where larger volumes of stormwater need to be managed.

SUB BASE Sometimes referred to as a gravel raft. Typically GAP40 or GAP65. Used to create a stable platform for the Permcon system in low CBR situations (see below).

SUB SURFACE DRAIN Typically a 110mm Novaflo pipe or similar. Directs excess stormwater in a controlled fashion into the local stormwater network, reducing peak flows.

FILTER CLOTH A non-woven geotextile that allows water to pass through into the sub grade and prevents soils from entering the basecourse.

SUB GRADE Undisturbed soil at the base of the Permcon system. The condition of this layer (CBR) determines the basecourse and sub base requirements.

GEOGRID Engineered polymeric materials with an open grid-like appearance. Used to reinforce the sub base layer in low CBR environments.

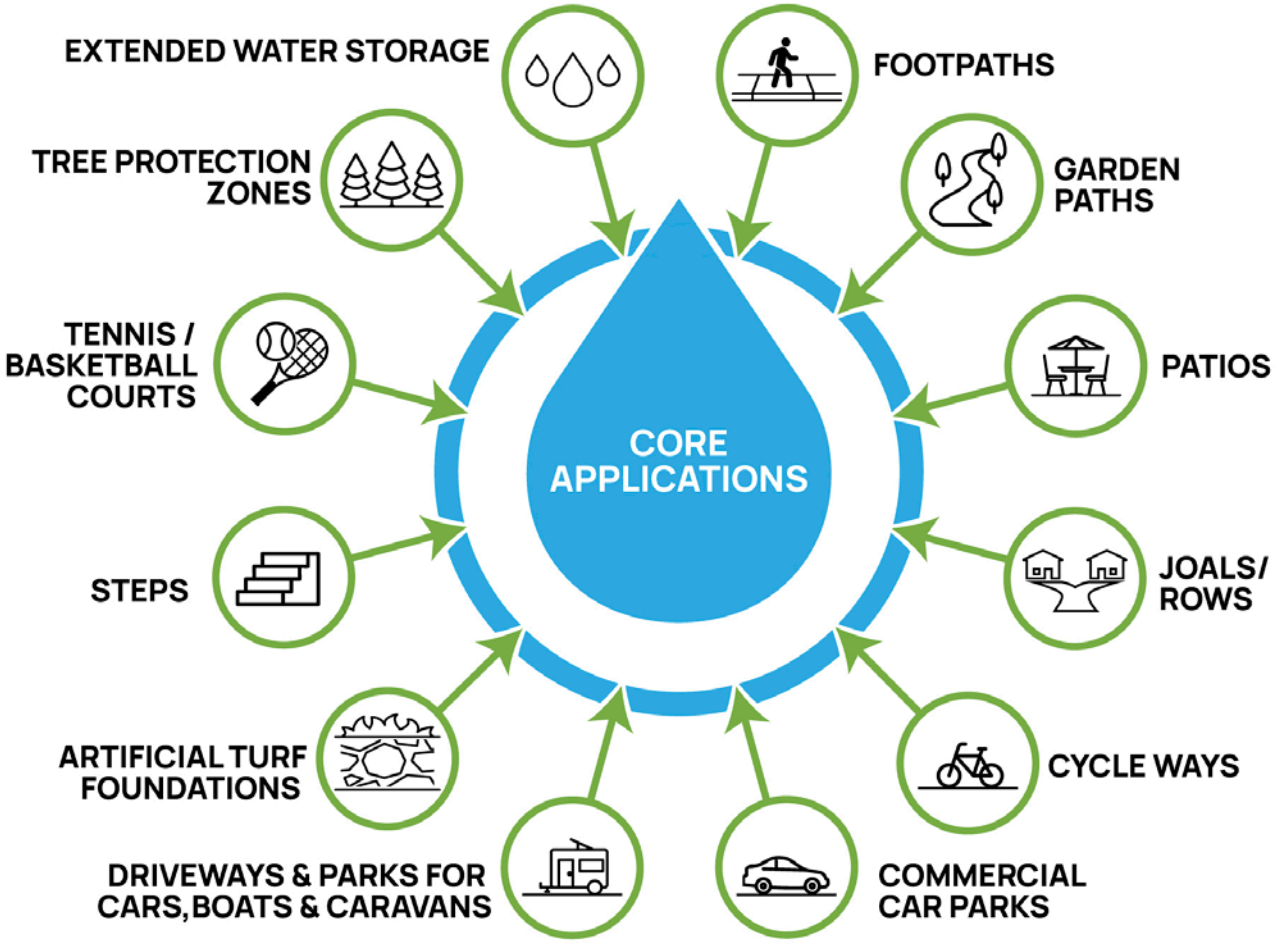
CBR California Bearing Ratio – a measure of the strength of the sub grade.

PERMCON

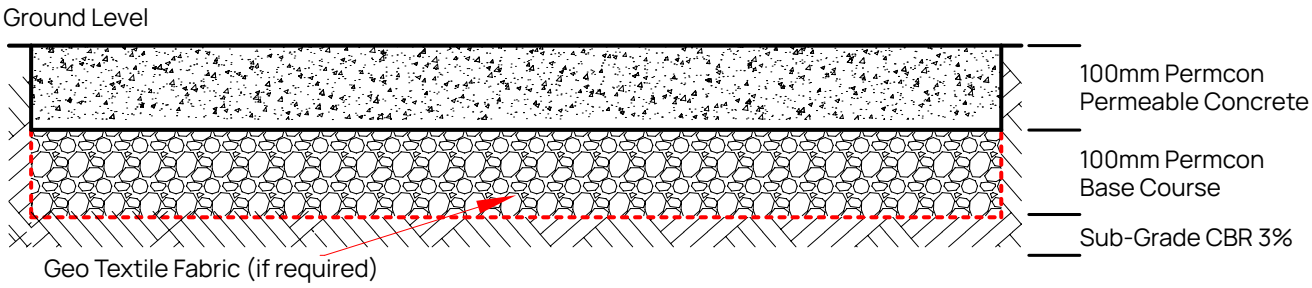
APPLICATIONS

Common applications for Permcon are footpaths, rights-of-way, domestic driveways, joint-ownership access lanes, carparks, cycleways, private open spaces (including as a base for artificial grass), tree protection zones, balconies and patios.

The core applications of Permcon permeable concrete are illustrated in the graphic below. While the system remains fundamentally the same across all applications, the different variations are covered in the following pages.



FOOTPATHS (TYPICAL DESIGN)

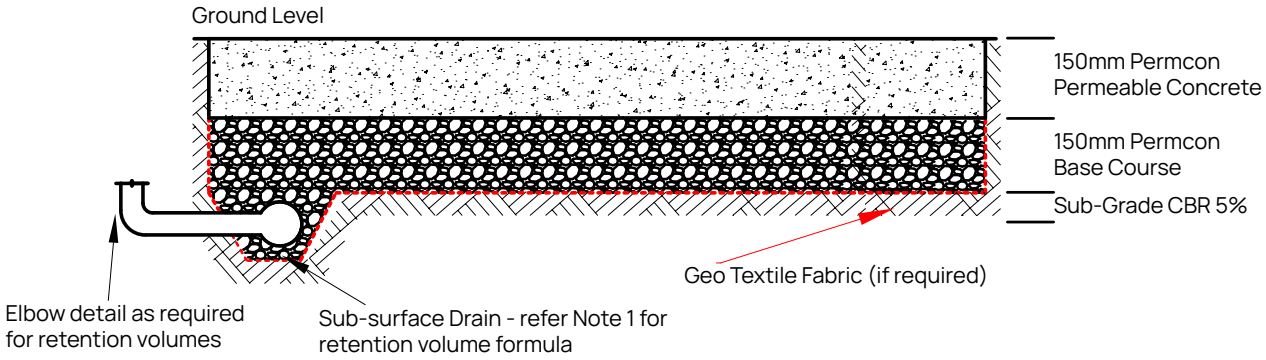


SURFACE/WEARING COURSE – Typically poured at a thickness of 100mm Permcon permeable concrete.

PERMEABLE BASE COURSE – 100mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

APPLICATIONS

DRIVEWAYS (TYPICAL DESIGN)

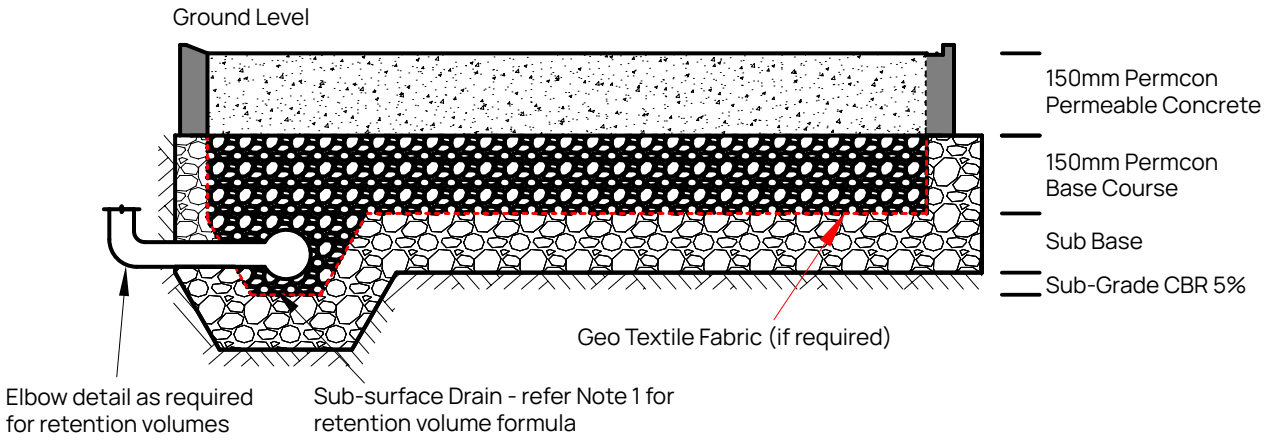


SURFACE/WEARING COURSE – Typically poured at a thickness of 150-200mm of Permcon permeable concrete.

PERMEABLE BASE COURSE – 150mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

SUB-SURFACE DRAIN – Typically a 110mm Novaflo pipe or similar. Directs excess stormwater in a controlled fashion into the local stormwater network, reducing peak flows.

RIGHTS-OF-WAY / JOINT-OWNERSHIP ACCESS LANES
(TYPICAL DESIGN)



SURFACE/WEARING COURSE – Typically poured at a thickness of 150mm Permcon permeable concrete.

PERMEABLE BASE COURSE – 150mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

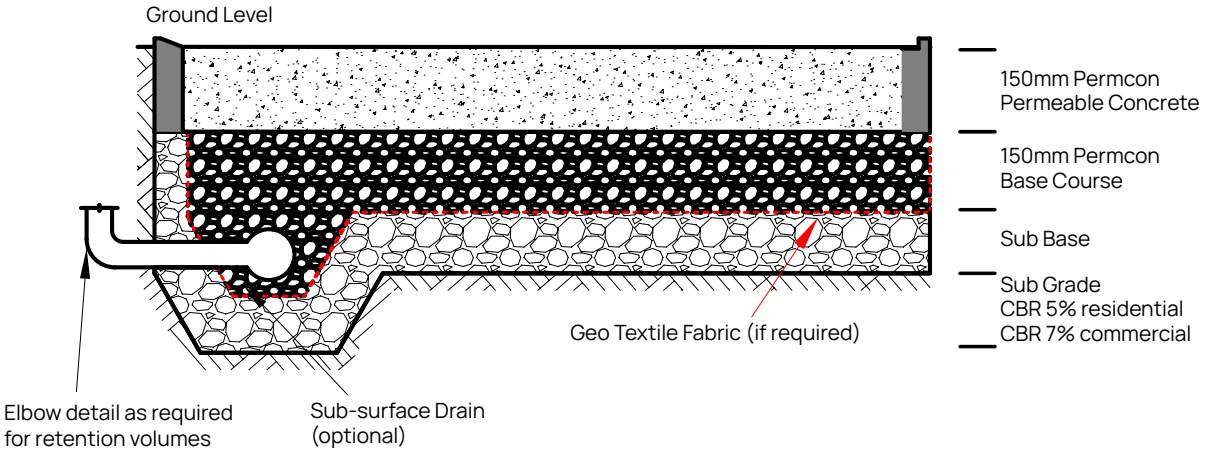
SUB BASE – A GAP gravel raft to ensure a stable platform for the Permcon system with a minimum CBR of 5+.

SUB-SURFACE DRAIN – Typically a 110mm Novaflo pipe or similar. Directs excess stormwater in a controlled fashion into the local stormwater network, reducing peak flows.

Note 1: retention volume formular = a x h x 0.3 a = area of paving m2 h = height between bottom of overflow outlet and base of form base course 0.3 = porosity of perm base course.

APPLICATIONS

CARPARKS (TYPICAL DESIGN)



SURFACE/WEARING COURSE – Typically poured at a thickness of 150-200mm of Permcon permeable concrete. The determination of thickness for this layer should be made in consultation with a civil engineer and follow civil drainage specifications.

PERMEABLE BASE COURSE – 150mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

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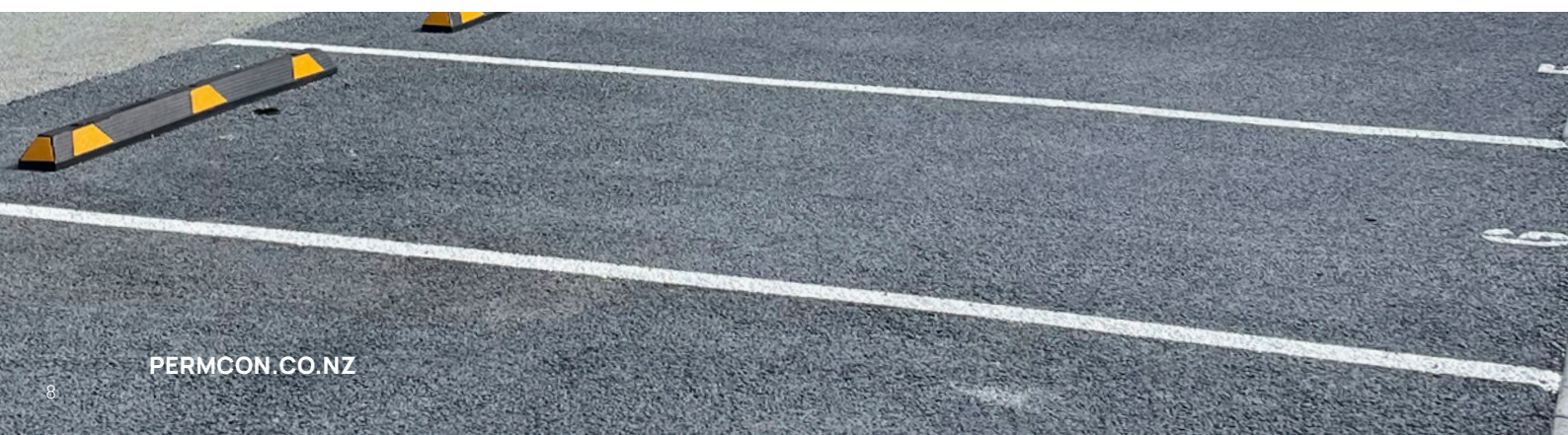
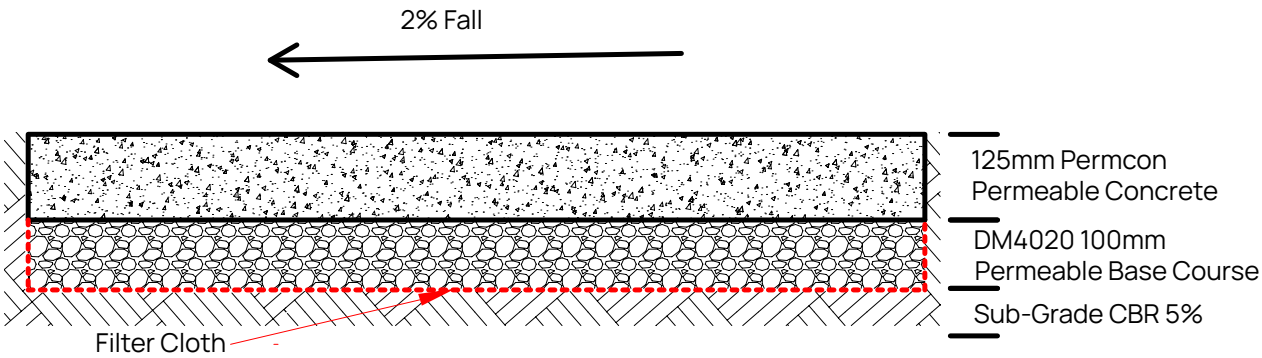


CYCLEWAYS (TYPICAL DESIGN)



SURFACE/WEARING COURSE – Typically poured at 125mm thickness of Permcon permeable concrete.

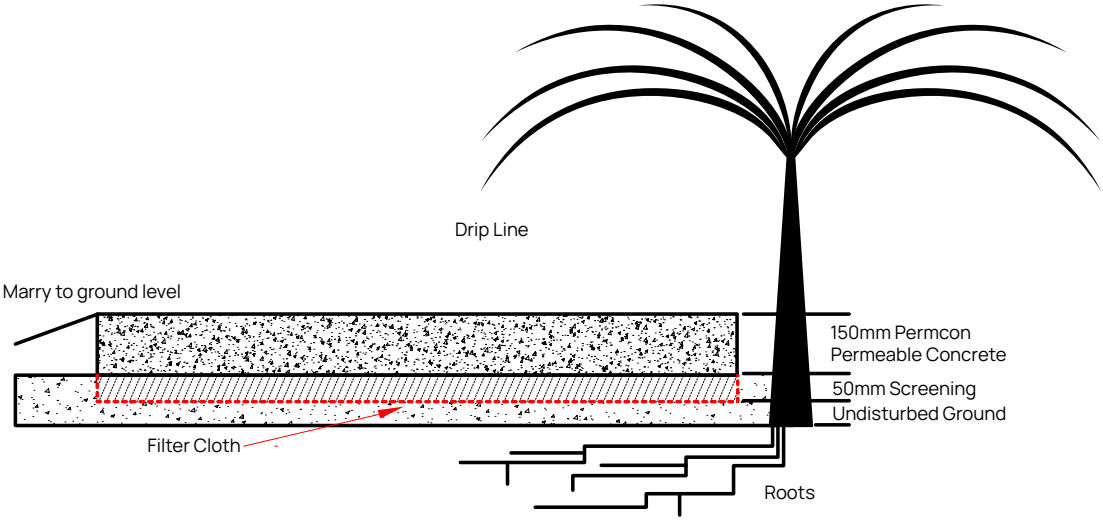
PERMEABLE BASE COURSE – 100mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

SUB GRADE – The undisturbed soil beneath the Permcon system. The condition of this layer (CBR) determines the basecourse requirements.

FILTER CLOTH – A polypropylene fabric, which allows water to pass through. It also assists in preventing contamination of the sub base when surrounded by clay soil.

APPLICATIONS

TREE PROTECTION ZONES
(TYPICAL DESIGN)



Permcon is, in some circumstances, suitable for installation immediately adjacent to trees and tree root zones.

When installed properly, Permcon will contribute significantly to the long-term sustainability of the tree. Any installation that will cover a tree root zone should be designed in conjunction with an arborist and it is recommended that the advice of an engineer be sought before installation.

Permcon is typically poured at a thickness of 150mm over a filter cloth and 50mm screening level on top of the existing top soil. However, please note the following specific requirements:

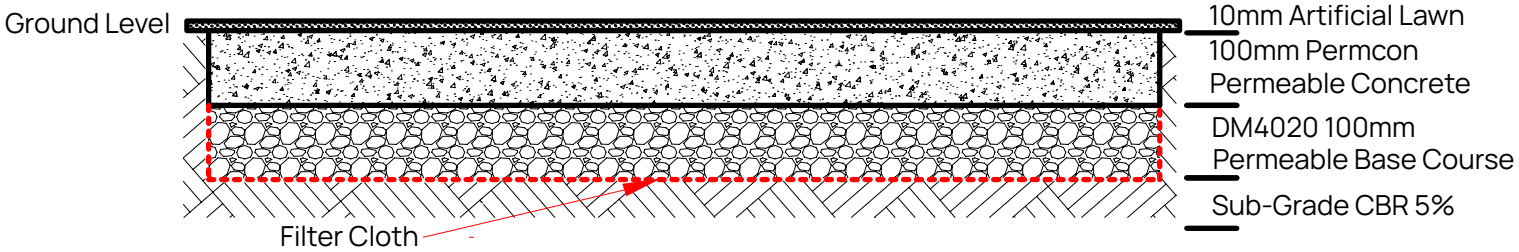
1. THE TREE PROTECTION ZONE SHOULD NOT BE EXCAVATED

This pertains only to installations surrounding trees and designed to specifically preserve the tree root zone.

2. THE TOPSOIL CANNOT BE PRONE TO SETTLING/SUBSIDING

3. THE MAXIMUM WEIGHT OF VEHICLES IS LIMITED (IE, RESIDENTIAL LIGHT TRAFFIC/SINGLE UNIT RESIDENTIAL DRIVEWAYS)

ARTIFICIAL LAWNS
(TYPICAL DESIGN)



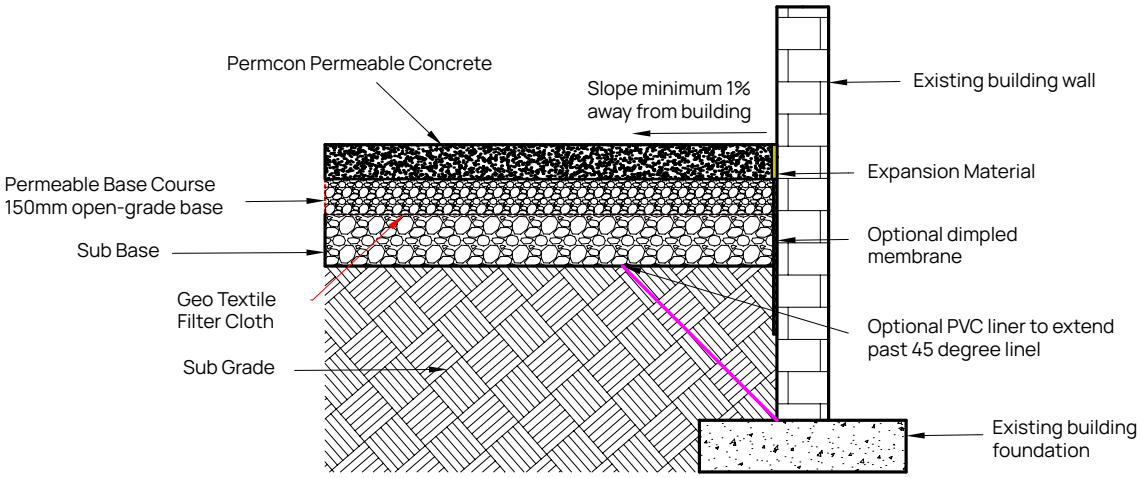
ARTIFICIAL LAWN – Typically 10mm thick. Using permeable concrete underneath provides a permeable solution for basketball and tennis courts, and other artificial grass surfaces.

SURFACE/WEARING COURSE – The surface under the artificial grass is typically poured at a thickness of 100mm of Permcon permeable concrete.

PERMEABLE BASE COURSE – 100mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

APPLICATIONS

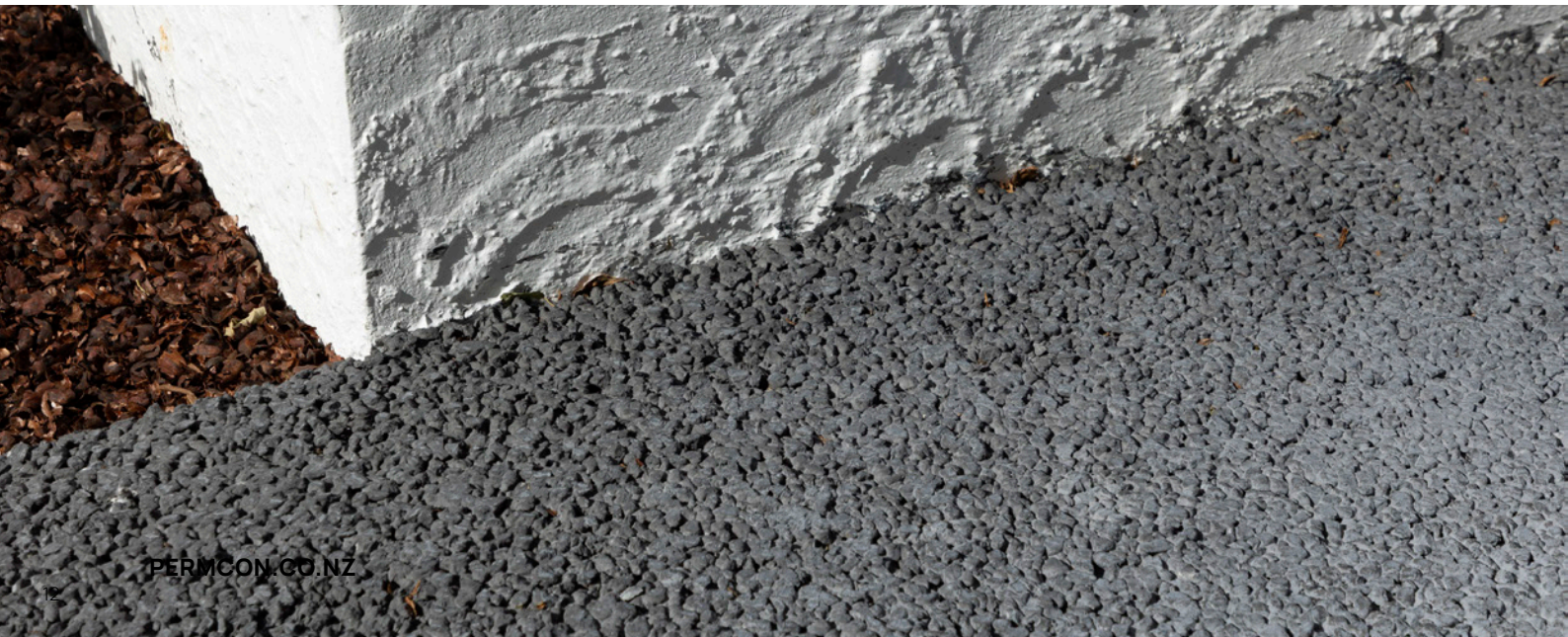
FOUNDATION WALL PROTECTION
(TYPICAL DESIGN)



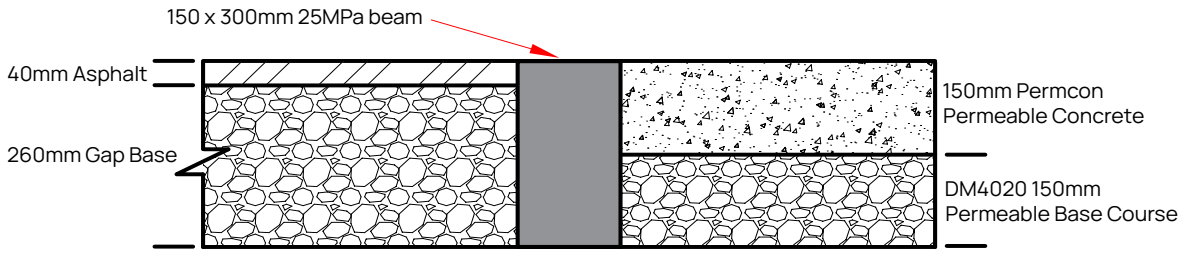
SURFACE/WEARING COURSE – Typically poured at a thickness of 100-150mm of Permcon permeable concrete. The determination of thickness for this layer should be made in consultation with a civil engineer and follow civil drainage specifications.

PERMEABLE BASE COURSE – 100-150mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

SUB BASE – A GAP gravel raft to ensure a stable platform for the Permcon system with a minimum CBR of 5+ for vehicular applications or 3+ for pedestrian applications.



ASPHALT INTERFACE (TYPICAL DESIGN)



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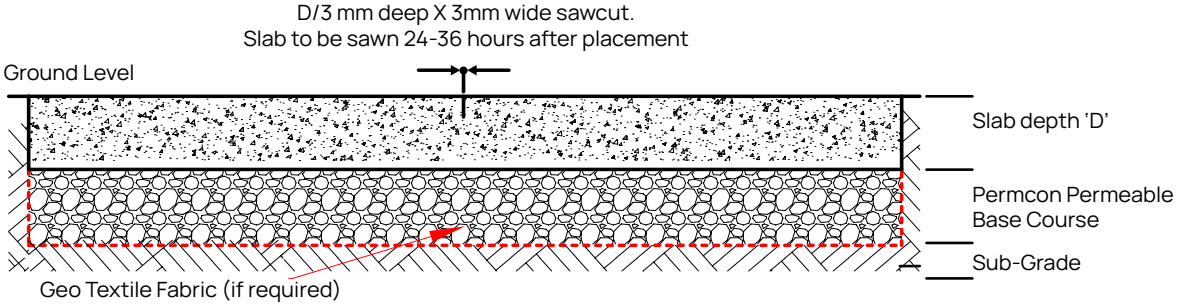
PERMEABLE BASE COURSE – 100-150mm layer of washed drainage aggregate, depending on application; usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable.

SAW CUTTING (TYPICAL DESIGN)

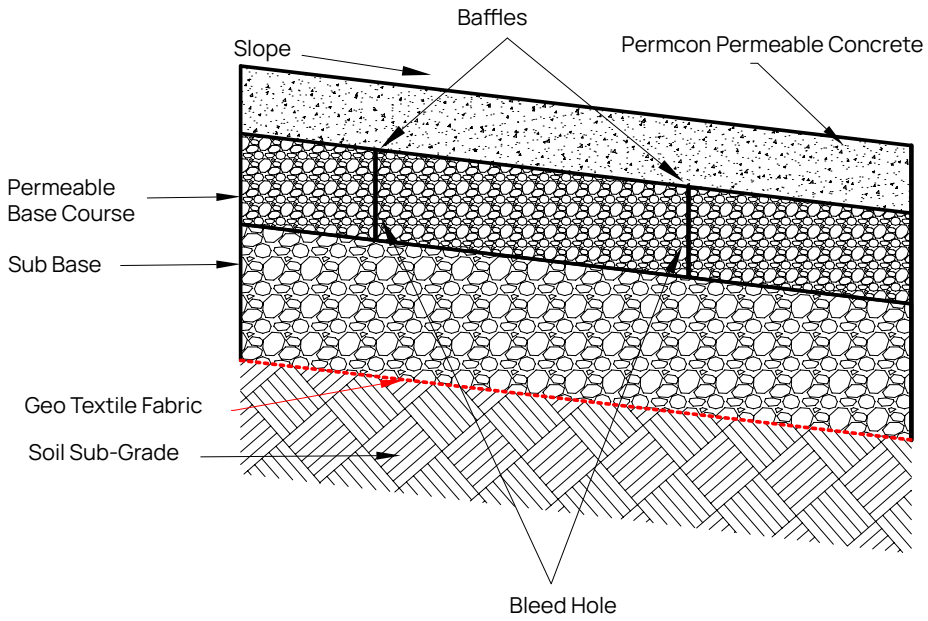
Saw cutting is used to control drying shrinkage in concrete by creating contraction joints that encourage the slab to crack in a controlled manner. These joints allow horizontal movement at right angles to the cut, relieving internal stresses that could otherwise lead to random cracking.



APPLICATIONS

SLOPES (TYPICAL DESIGN)

Maximum slopes before specific engineering required is 12%. For slopes over 5%, a baffle is recommended every 15m of slope length if the length exceeds 28m.



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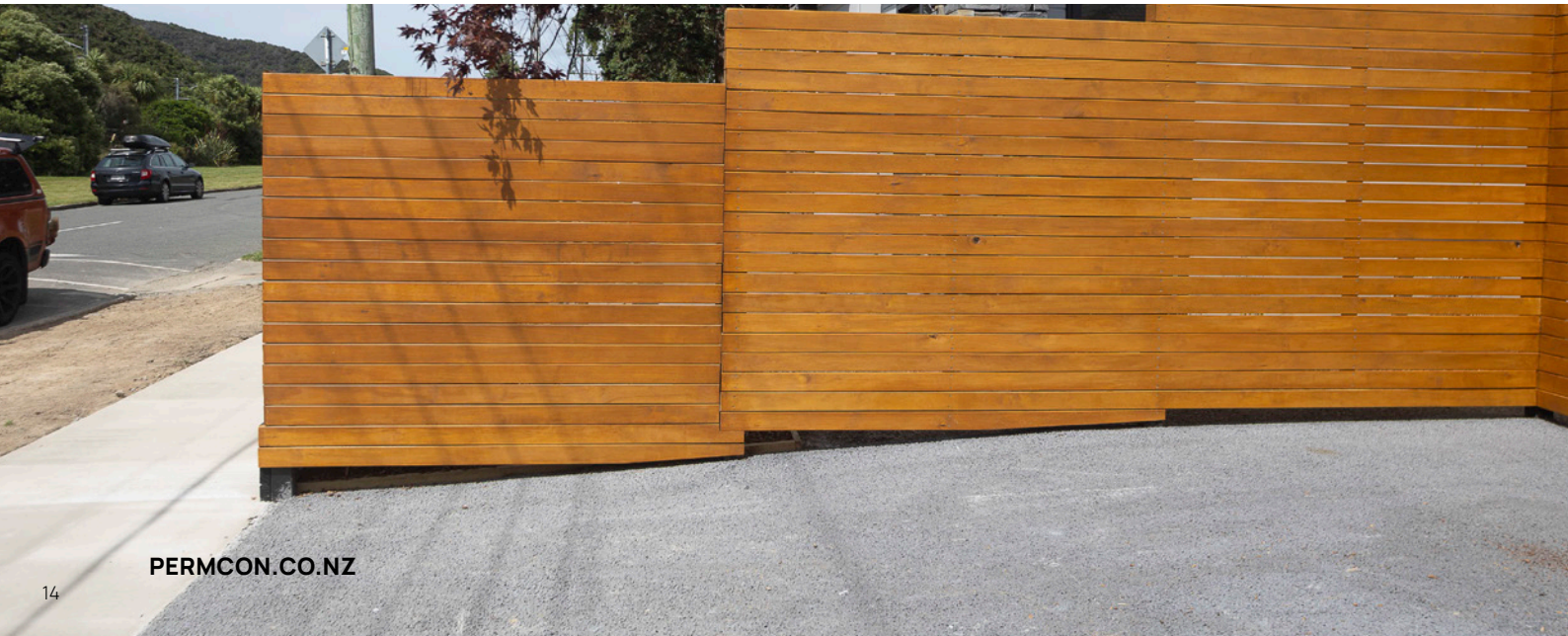
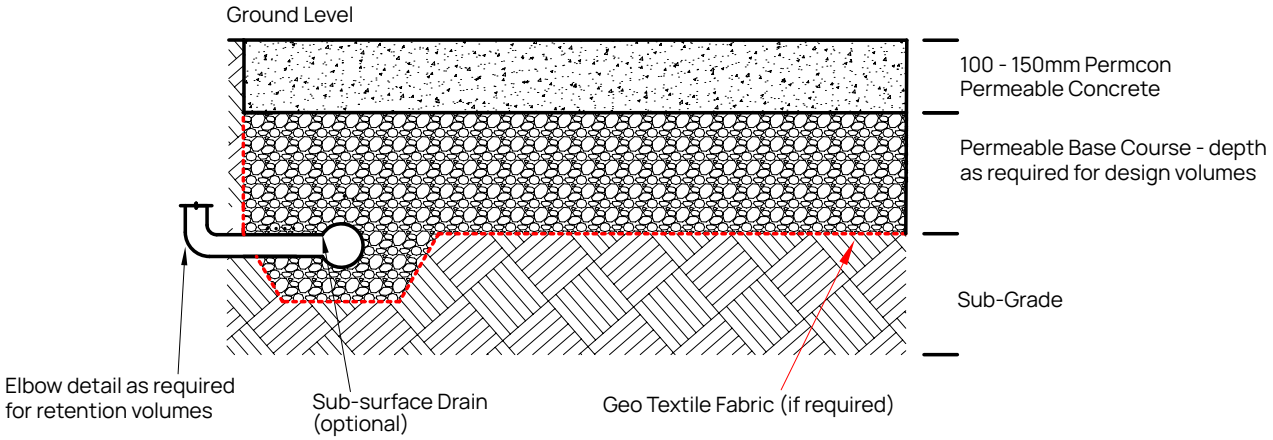


EXTENDED WATER STORAGE
(TYPICAL DESIGN)



SURFACE/WEARING COURSE – Typically poured at a thickness of 100-150mm of Permcon permeable concrete. The determination of thickness for this layer should be made in consultation with a civil engineer and follow civil drainage specifications.

PERMEABLE BASE COURSE – 150mm layer of washed drainage aggregate, usually a Greywackie rock DM40/20 or similar. Normal GAP types of aggregate are not suitable. If higher water volumes are required to be retained in the permeable basecourse, additional depth can be added. Each 100mm will add 25L of water storage. The basecourse should be installed and compacted at maximum 150mm layers to ensure adequate compaction in the system.

SUB-SURFACE DRAIN – Typically a 110mm Novaflo pipe or similar. Directs excess stormwater in a controlled fashion into the local stormwater network, reducing peak flows.

PLANNING & INSTALLATION

Before installation, assess the site and understand how the Permcon system will manage runoff. On large areas, hydrological design may be required to meet runoff storage or discharge capacity. Ensure the following steps are completed in sequence before the job begins.

1. MARK THE AREA

Mark out the area where Permcon will be installed. Install erosion or sediment control if needed.

2. CONFIRM EDGE CONDITIONS

Check the type and height of all edging around the slab or pavement area.

3. EXCAVATE TO DESIGN DEPTH

Excavate the sub base based on the expected traffic load. Use Table 1 and the calculated water storage volume to determine the correct depth for detention or infiltration systems.

LOADING CONDITION	SUB GRADE CLASSIFICATION		
	WEAK CBR <5	MEDIUM CBR 6-10	STRONG CBR 10+
Residential Pedestrian Patio/Pathway Geotextile Filter Cloth	100mm permeable basecourse Class C	100mm permeable basecourse Class B	100mm permeable basecourse Class A
Residential Light Traffic* Single Unit Residential Driveways Geotextile Filter Cloth	*CBR <3 requires specific design 150mm permeable basecourse Class D	150mm permeable basecourse Class C	150mm permeable basecourse Class B
Residential Light to Medium Traffic Multi Unit Residential Driveways Geotextile Filter Cloth	CBR <5 requires specific design	150mm permeable basecourse Class D	150mm permeable basecourse Class C
Public Footpath Low and High Impact Geotextile Filter Cloth	150mm permeable basecourse Class D	150mm permeable basecourse Class C	150mm permeable basecourse Class B

Geotextile Fabrics

Class A - BIDIM A14 or similar
Class B - BIDIM A19 or similar
Class C - BIDIM A29 or similar
Class D - BIDIM A39 or similar

Table 1

Note: Once the sub grade is exposed, you can quickly check the CBR by wetting the ground and walking across it. A clear, full imprint indicates a weak CBR; a heel imprint indicates a medium CBR; no imprint indicates a strong CBR. This process does not replace the need for an official geotechnical report. CBR can be accurately assessed using a Scala Penetrometer (*NZS 4402:1986*).

4. PREPARE THE SUBGRADE

Once excavation is complete, the subgrade must be even, uniform and free of standing water, organic material or debris. If needed, apply a thin bedding sand layer to smooth out undulations before placing geotextile.

The subgrade should be compacted to the specified density and moisture content:

- Minimum 5% CBR for pedestrian areas and residential driveways.
- Minimum 10% CBR for vehicular areas.

Weak or saturated soils may require stabilisation. Compaction can reduce permeability, and open-graded basecourses may need underdrains.

Note: On sloping sites, water may resurface at low points. Crossflow can be encouraged using weirs, or storage capacity concentrated at the low point. Alternatively, a drainage coil can be used to divert water to another system.

5. INSTALL SUB BASE AND UNDERDRAIN (IF REQUIRED)

If specified, lay a sub base layer over the area. If an underdrain is part of the design, install it with a 0.5% slope and filter sock (if required), then connect to the stormwater outlet with a watertight fit. Carefully backfill over the drain with 50mm basecourse.

6. INSTALL GEOTEXTILE

Place over the subgrade, or over the underdrain where applicable, to prevent clogging from sediment.

7. PLACE PERMEABLE BASECOURSE

Lay clean, washed, open-graded permeable aggregate to the required depth and level. It must contain a minimum of 30% voids. Place another layer of geotextile over the basecourse if specified.

INSTALLATION

8. FORM UP

Set formwork to the correct height and shape. Ensure falls meet Building Code requirements.

9. INSTALL PERMCON

Place Permcon permeable concrete in accordance with specifications. Only certified Permcon installers should perform this work.

10. RESTORE THE SITE

Clean up materials, reinstate surrounding areas and regrass disturbed ground. Remove sediment controls. Check that all underdrain connections to stormwater outlets are clear.

11. ATTACHMENTS

Car stops and pool fencing can be installed through Permcon permeable concrete as per standard concrete.

MATERIALS

The structural and hydraulic performance of the Permcon system depends on the correct specification and handling of all materials.

Each material component must meet defined grading, strength and permeability requirements. These directly influence load support, compaction, infiltration rate and long-term system function. This section outlines the required Permcon material properties, referencing relevant New Zealand standards and best practice for permeable pavements.

BASE COURSE

The basecourse layer must use clean, open-graded drainage aggregate – typically a crushed Greywacke such as DM40/20. Sub grades weaker than a CBR of 5 will require specific design.

- DM40/20 stores approx. 400L/m³.
- To allow for variation, use a working figure of 85% capacity.
- A 100mm thick layer stores roughly 34L/m².

PROPERTY		STANDARD	TEST METHOD	RESULT
SOURCE	Solid Density	NZS 4407:1991	Test 3.7.2	2.72t/m³
	Abrasion Resistance	NZS 4407:1991	Test 3.12	~11%
	Weathering Quality	NZS 3111:1986	Test 15	AA
	Crushing Resistance	NZS 3111:1986	Test 14	450≥
PRODUCTION	Permeability	Volume 2, Section 10.6 Method of soil laboratory testing by K. H. Head		k = 7.0 -3m/s
	Broken Face Content	NZS 4407:1991	Test 3.14	100%
	Cleaness Value	NZS 3111:1986	Test 13	70≥
OTHER	Maximum Dry Density	NZS 4402:1986	Test 4.2.2	DM40/20 or similar ~1.65 t/m³
				DM40/20 or similar ~1.60 t/m³
	Maximum Dry Density	NZS 4402:1986	Test 4.1.1	DM40/20 or similar ~1.45 t/m³
				DM40/20 or similar ~1.45 t/m³
	Total Voids % (From Maximum Dry Density Data)			>40%

Table 2. Characteristics of Greywacke WPB12 and WPB40

MATERIALS

SIEVE ANALYSIS			
SIEVE APERTURE	% PASSING	SPECIFIED MIN	SPECIFIED MAX
53.0mm	100	-	-
37.5mm	100	100	100
26.5mm	83	65	85
19.0mm	25	20	50
13.2mm	3	0	25
9.5mm	1	0	10
6.7mm	0	0	5
4.75mm	0	-	-

Table 3. WPB40 grading envelope

PERMCON CONTINUOUS POUR PERMEABLE CONCRETE

A specifically designed mix with strict batching controls.

GEOTEXTILE FILTER CLOTH

Non-woven polypropylene fabric.

GEOGRID (SUB GRADE REINFORCEMENT)

For pavement construction using geogrids over very soft subgrade (CBR below 5), it is recommended not to use vibrating compaction equipment. This is to reduce the possibility of 'livening' the sub grade and shifting soil particles into the basecourse before sufficient interlock has been achieved.

If the subgrade is livened as a result of over-compaction and/or excessive water, roading construction should be put on hold to allow for setting before proceeding with subsequent layers.

Installation should be in layers not more than 150mm thick to ensure adequate compaction.

Do not unload the sub base material directly onto geogrids. Use stockpiles instead.

Stockpiles of sub base material should be spread using mechanical plant, such as a loader with an opening bucket or an excavator bucket. The first layer should be statically rolled with a small number of passes using a light roller to create interlock between the geogrid and the aggregate.

If the pavement includes multiple geogrid layers, each additional layer should also be statically rolled with a small number of passes.

If construction is taking place in wet conditions and pumping is likely, a layer of geotextile should be placed beneath the geogrid.

Tri-axial geogrids, which have triangular apertures, may be laid either parallel to the road centre line or in the transverse direction. The overlap between adjacent rolls depends on the grading, sub base thickness and the stiffness of the sub grade.

Overlaps must be at least 300mm and no more than 600mm, unless otherwise specified by the engineer. Overlaps must remain in place during filling. This is usually done by placing small heaps of fill over the overlaps ahead of the main filling process. No traffic or site plant is permitted on the geogrid before the sub-base aggregate is placed.

Compaction of unbound materials used for sub base and road base layers must follow the specification for sub base aggregate.

LOW CARBON OPTIONS

For proven performance with lower carbon content, Permcon CarbonLow offers a seamless upgrade, which can be specified and installed in exactly the same way as our standard Permcon mix.

Manufactured to reduce embodied carbon by 62.2%, Permcon CarbonLow is a Toitū assessed low-carbon option delivering the same strength, durability and permeability of the standard Permcon system – specified and installed in exactly the same way – with a lower environmental impact.

Developed using lifecycle modelling aligned with EPD and ISO 14040/44 standards, Permcon CarbonLow supports climate-aligned infrastructure goals without requiring changes to your existing specifications or construction methods.

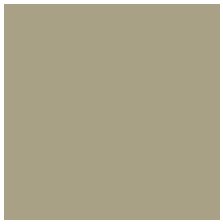
Permcon CarbonLow looks and performs the same as standard Permcon permeable concrete:

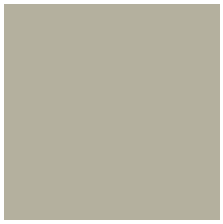
PERMCON
CarbonLow

COLOURS

Permcon permeable concrete is available in a variety of colours to create a more desirable and unique look to complement our natural and built environments.

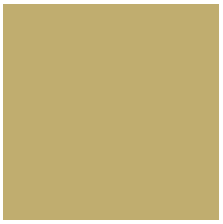
Colour swatches are indicative only due to natural variances in materials and pitting of Permcon, which creates a shadowing affect that makes the actual colour look darker than swatches.

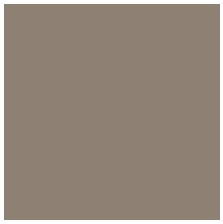

SAND STORM

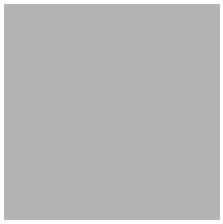

SEA BREEZE

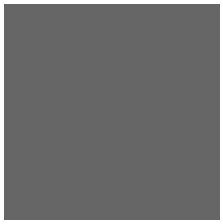

HEAT WAVE


ICE STORM


INDIAN SUMMER


MONSOON

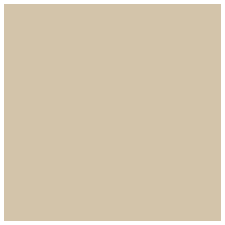

ASH

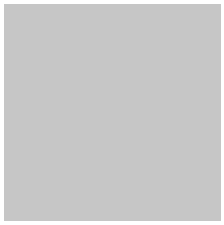

CHARCOAL


BLACK VELVET

NATURAL

PERMCON CarbonLow


LATTE


PLATINUM

MAINTENANCE

RESIDENTIAL

DRIVEWAYS, FOOTPATHS AND PATIOS

- **Sweep regularly**.
- **In locations where leaves drop on the pavement**, regular cleaning/blowing of leaves to stop organic sediment decomposing on the surface and joints. This is the most important activity in maintaining the Permcon permeable concrete paving system.
- **Every year** – general cleaning/weed/moss control with a rotary head cleaner or hosing.
- **Once a year, inspect after a rain event.** If there is standing water or puddles, then permeability has been compromised. Contact the local Permcon representative for advice on restorative actions.

COMMERCIAL

CAR PARKS, ROWs, CYCLEWAYS

- **Every year** – general inspection.
- **Every year** – general cleaning with a sweep truck or similar.
- **Every ten years** – check the permeability of the system. If the water stands for one hour or has a permeability rate of less than 250mm/hr, proceed with corrective maintenance.
- **Once a year, inspect after a rain event.** If there is standing water or puddles, then permeability has been compromised. Contact the local Permcon representative for advice on restorative actions.

FAQS

HOW LONG DOES PERMEABLE CONCRETE LAST?

When properly installed and maintained, permeable concrete typically lasts 15–20 years.

CAN PERMEABLE CONCRETE CLOG UP?

Yes — but regular sweeping or surface washing will help prevent it. If clogging occurs, an industrial vacuum can be used to clear the voids.

HOW LONG DOES IT TAKE BEFORE THE SYSTEM CLOGS UP?

It depends on the site and the level of sediment in the run-off. Key factors include:

- Whether the system is located in a suitable place.
- The amount of organic matter (eg, leaves) or clay present.
- The level of maintenance (sweeping is recommended).

Sites with high clay content or heavy organic loads should be avoided, or cleaned regularly.

WHAT IS THE VOID RATIO IN PERMEABLE CONCRETE?

It typically ranges from 15-30%. Permcon permeable concrete usually delivers a consistent 20–25%.

HOW CAN I TEST THE PERMEABILITY OF MY PAVEMENT SYSTEM?

Use ASTM C1701/C1701M-09: Standard Test Method for Infiltration Rate of In-Place Pervious Concrete. It's a simple test that can be performed on-site.

CAN PERMEABLE CONCRETE BE PUMPED INTO AN INSTALLATION?

No. Because it's a low-slump product, it cannot be pumped like traditional concrete. It must be placed manually or with adapted methods.

WHAT KIND OF AGGREGATES CAN I USE FOR THE BASE COURSE?

Use specifically designed drainage aggregates that remain stable when saturated. Standard GAP aggregates are not suitable and will lead to pavement failure.

PERMCON

CONTACT DETAILS

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