

DRAINAGE OF CONCRETE BLOCK PAVING

CMA Technical Note



**Concrete
Manufacturers
Association**

DRAINAGE OF CONCRETE BLOCK PAVING

BACKGROUND

Concrete Block Paving (CBP) differs from other forms of surfacing in that it comprises small segments and therefore is criss-crossed by a network of close spaced joints filled with sand. This means CBP is permeable and drainage of the surface and underlying layers is important. There is limited full scale testing world wide but from a study conducted by Dr Brian Shackel of the University of New South Wales, Australia, the following conclusions were drawn:-

1. Between 30% to 35% of rainfall will penetrate newly laid, untrafficked, and unsealed block pavements.
2. Increase in pavement crossfall will increase surface runoff. (Recommended min. slope of 2%.)
3. The permeability of the joints can be reduced by up to 50% with an application of a water based acrylic sealer. Similarly infiltration can be inhibited by using 10% of lime or 6% bentonite to the jointing sand.

Generally no attempt is made to seal the joints hence attention should be directed towards reducing the consequences of water infiltration, particularly during the early life of the pavement. In practice care must be taken to select bedding sands not susceptible to water or seal the base if it comprises unbound granular materials or select base materials bound and waterproofed with cement, lime or bitumen.

The management of water runoff and infiltration becomes therefore a critical aspect that will affect the performance and integrity of the CBP. Good, surface and subsoil drainage is essential for satisfactory pavement performance. Drainage needs to be considered during the design, specification and construction phases of a project.

The following recommendations and detailing, although not new, but seldom practiced, are paramount for a trouble free and structurally sound CBP.

A. SURFACE DRAINAGE

Surface drainage should be designed and installed as thoroughly as for other pavements noting local site conditions such as:

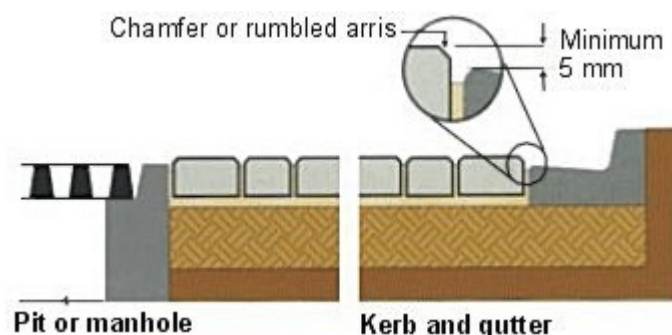
1. Climatic Conditions, particularly rainfall.
2. Ground Water Levels and seasonal influence i.e. flood or tidal conditions.
3. Soil Profile.

KEY DETAILING NOTES

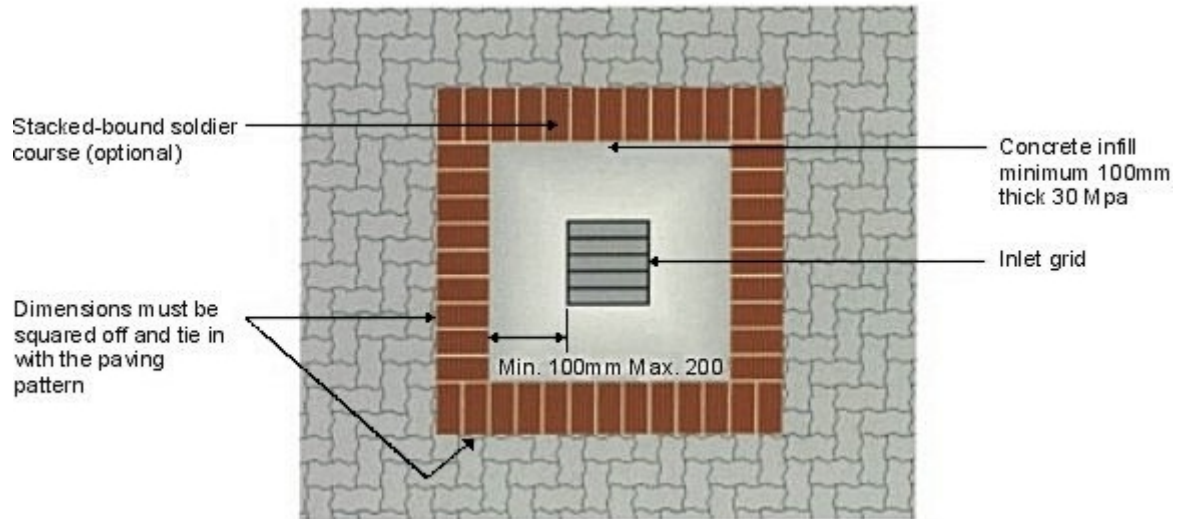
- Min. Longitudinal fall of 1% and a crossfall of 2%.
- Paving should be set a min. 5mm higher at drains, gutters and manhole inlets.

SURFACE DRAINAGE DETAILS

Detail A1 - Drains and gutter

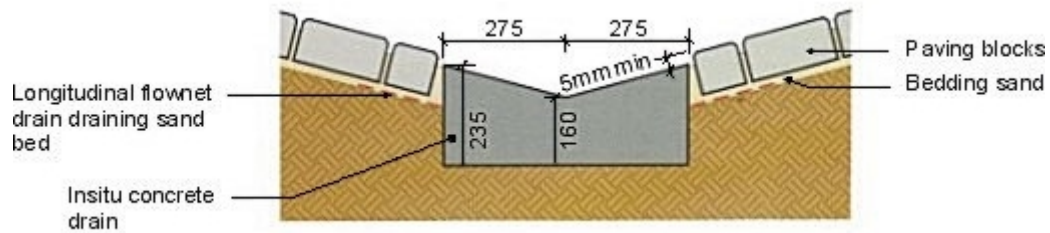


Detail A2 - Manhole inlet

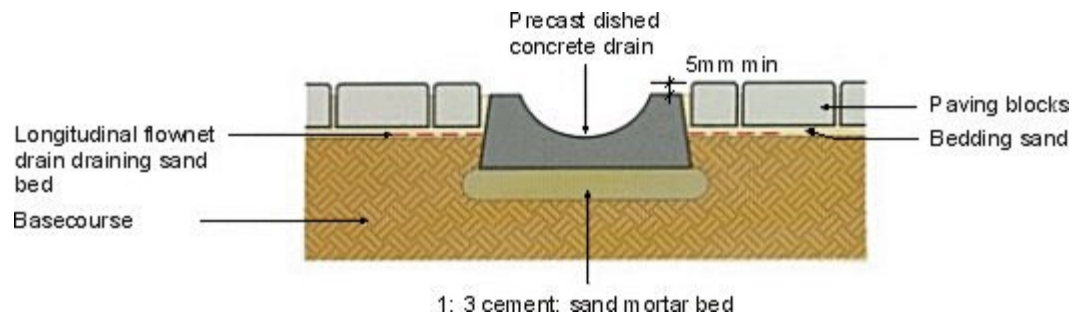


- Special attention to compaction and possible stabilisation of backfill to manholes and inlets to prevent subsidence

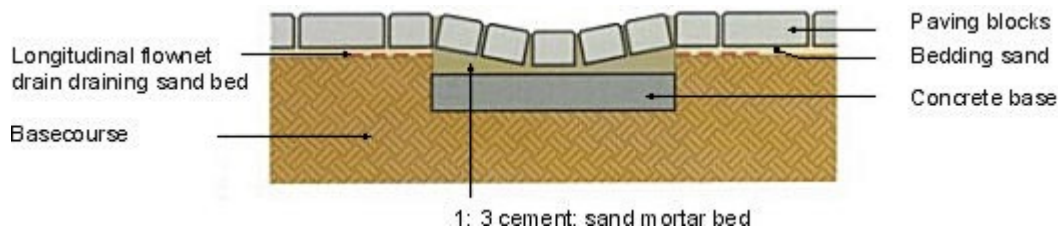
Detail A3 - Insitu concrete drain



Detail A4 - Precast concrete drain



Detail A5 - Block paving drain



B. BEDDING LAYER DRAINAGE

The drainage of the bedding sand is crucial particularly where stabilized bases are used and up against kerbs, edge beams and manhole inlets. This aspect is often neglected and leads to a build up or "boxing in" of water which pumps under traffic washing out the jointing and bedding sand leading to progressive failure.

Select bedding sand not susceptible to water and to the correct grading shown below.

a) Bedding sand grading

(Nom sieve size mm)	% Passing
9,52	100
4,75	95 - 100
2,36	80 - 100
1,18	50 - 80
0,600	25 - 60
0,300	10 - 30
0,150	5 - 15
0,075	0 - 10

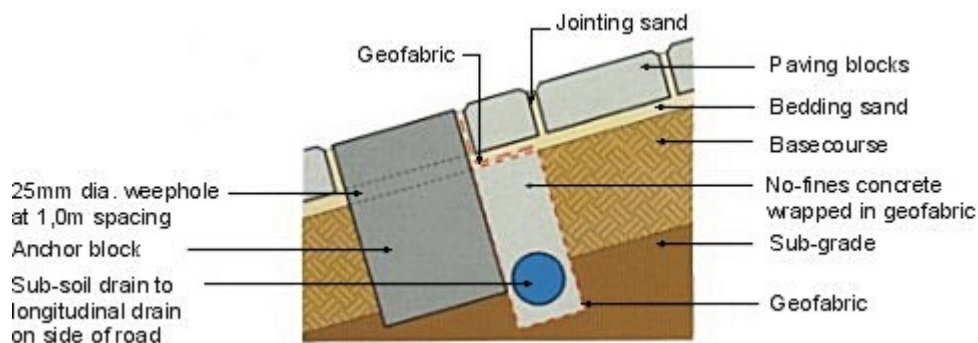
b) Jointing sand

Sand should pass a 1,18mm sieve and contain 10% - 50% of material passing a 0,075 sieve.

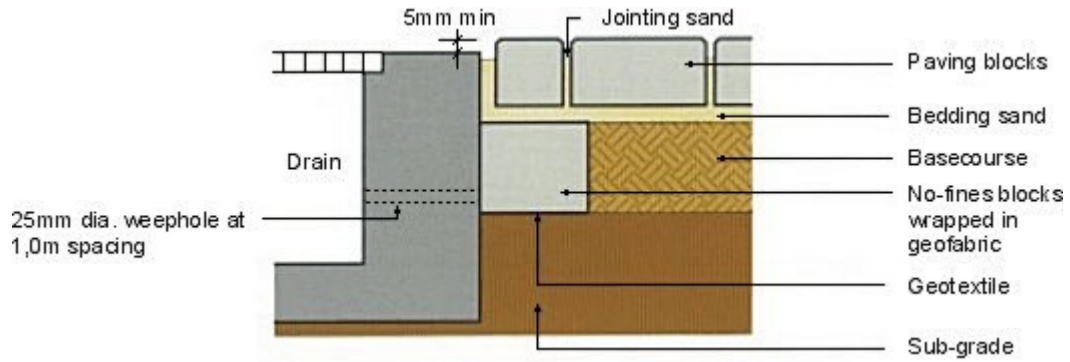
- Bituminous seal should be considered for all unbound base material before placing bedding sand.

SAND BED DRAINAGE DETAILS

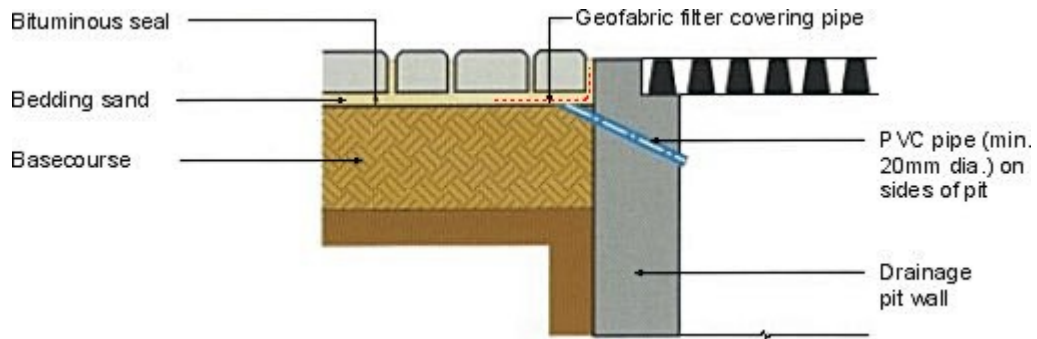
Detail B1 - Steep slopes



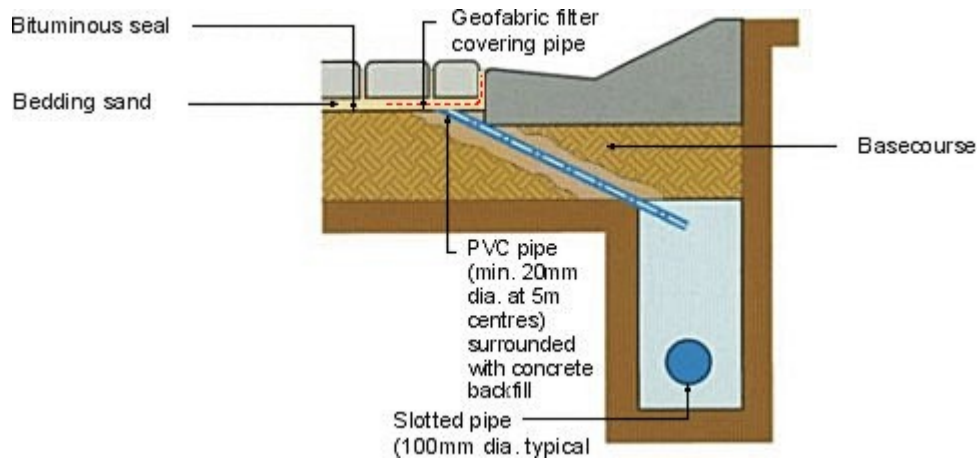
Detail B2 - Into drainage pits using sub soil drains



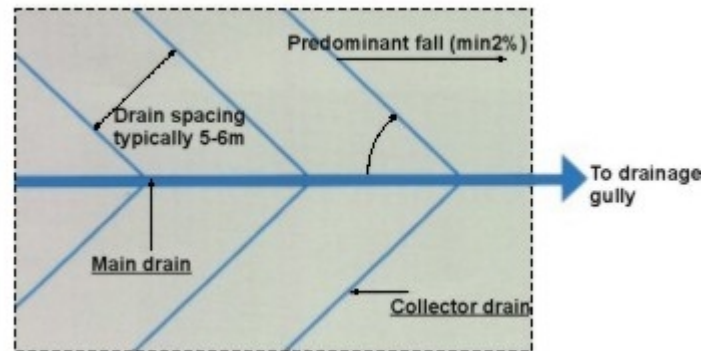
Detail B3 - Into drainage pits



Detail B4 - Into subsoil drain

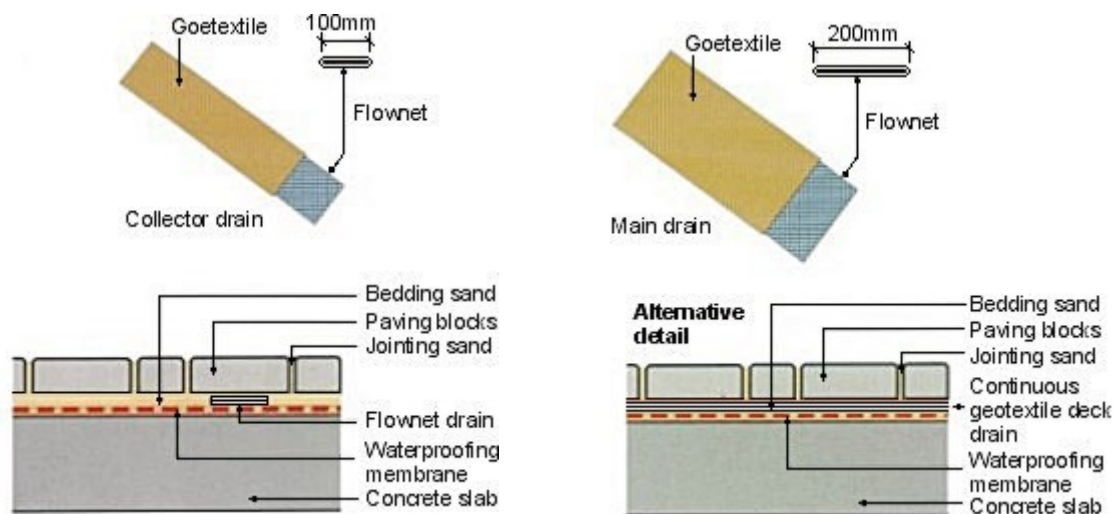


Detail B2 - Into drainage pits using sub soil drains



Plan view of fishbone drainage below paving

Flownet drains



CONCRETE MANUFACTURERS ASSOCIATION - MEMBERSHIP LIST - PAVING

PRODUCER MEMBERS

Company Name	Area	Telephone
Bafokeng Brick & Tile	Rustenburg	(014) 538 0842
Bamburi Special Products Ltd	Nairobi, Kenya	09254 2 530504
* Brickcast Industries cc	Marbleray	(031) 507 7094
CEL	Maitland	(021) 905 5998
* Concor Technicrete (Pty) Ltd	Johannesburg	(011) 495 2200
* Cororbrik (Pty) Ltd	Durban North	(031) 560 3911
* Deranco Blocks (Pty) Ltd	Port Elizabeth	(041) 463 3338
False Bay Bricks	Eerste River	(021) 904 1620
* Grinaker Precast (Pty) Ltd	Lyttelton	(012) 652 0000
* Grinaker Precast (KZN) Pty Ltd	Redhill	(031) 564 1304
* Inca Masonry Products (Pty) Ltd	Cambridge	(043) 745 1215
* Mimosa Brick (Pty) Ltd	Meyerton	(0163) 620507
* Neat Contech	Kenton-on-sea	(04664) 81359
Precast Concrete Industries	Windhoek, Namibia	(09264 61 280 4103
* Stanger Brick & Tile (Pty) Ltd	Mandini	(032) 457 0237
* Vanstone	Rosslyn	(012) 541 2056
* Vibro Bricks (Pty) Ltd	Erasmia	(012) 374 2032

* Companies which hold the SABS Mark

CONCRETE MANUFACTURERS ASSOCIATION - MEMBERSHIP LIST - PAVING

NON-PRODUCER / CONTRACTORS

Company Name	Area	Telephone
Brick King & Associates	Sanlamhof	(021) 948 6218
Inca (Cape)	Eerst River	(021) 904 1620
Natal Paving (Pty) Ltd	Wandsbeck	(031) 209 3115
Pave Show cc	Groenkloof	(011) 315 3155
PYW Paving cc	Amanzintoti	(031) 903 2104
Randpave Industrial Contracts	Birnam Park	(011) 805 1894
SA Paving Gauteng (Pty) Ltd	Orange Grove	(011) 483 1350
Sun Paving	New Germany	(031) 705 5123



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