pave-it

news from interpave

November 2006 › issue eight

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the latest news from Interpave focusing on precast concrete paving

paving awards

exclusive coverage of the 2006 Interpave Award winner and short-listed schemes just announced

sustainable paving

the latest on permeable pavement technology, SUDS and rainwater management around the home

information resource

new research on comparative costs and a host of other information from Interpave on today's topical issues

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the latest on concrete block paving, flags and kerbs »

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NEW

- Comparative cost research for paving
- The case for Precast Concrete Kerbs
- Model Specification for concrete paving block installation
- Permeable Paving FAQs and the latest technical advice

...and coming soon:

- The latest edition of Interpave's definitive permeable paving design and construction guide
- New design guidance for rainwater management around the home
- A new brochure on the legal framework surrounding permeable paving
- Model Specifications for installing precast concrete paving flags and kerbs

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above: The 2006 Interpave Award winner, just announced – go to page 6 for the full story.

below: Precast concrete kerbs – the unsung heroes of paving (page 12).

about Interpave

Interpave – the Precast Concrete Paving & Kerb Association – represents the leading manufacturers of concrete block paving, flags and kerbs. Its main objective is to expand the use of these materials through education, technical and marketing campaigns.

Interpave is a product association of the British Precast Concrete Federation.

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welcome...

to the eighth issue of Pave-It

You might be tempted to think that there can't be enough new paving topics to fill another issue of Pave-It but actually we have struggled to fit everything in, as a lot has happened over the last few months.

Firstly, I am delighted that Pave-It is the vehicle to announce the Interpave Award results (see page 6) – congratulations to all those involved with the winning, commended and short-listed projects. Apart from the Award, Interpave has been particularly busy, instigating research, engaging with government agencies, supporting training initiatives and expanding the website resource with up-to-date, comprehensive information as the UK's paving authority.

One important initiative is the extensive cost research sponsored by Interpave and carried out by Scott Wilson, now available to guide paving designers on a wide range of applications and – for the first time – provide an accurate picture of permeable pavement cost benefits. Development of permeable pavement technology continues and a completely new edition of the authoritative Interpave design guide will be published shortly. In parallel, a new design guide for sustainable paving around the home – focusing on the responsible handling of water run-off – is nearing completion. These and other issues, including the legal framework that should be driving sustainable drainage forward in the UK, are discussed in our Permeable Paving Special starting on page 13.
I hope you enjoy this issue of Pave-It. Do let me have your feedback – with letters commenting on the articles, suggestions for future topics or projects which we can include – and, of course, your registration for future issues. If you haven't registered already, just visit the Interpave website.

John Howe
General Manager
(pictured right: getting his hands dirty at an HLTG course, see page 11.)

PAVIOR'S MEDAL FOR EXCELLENCE

The 2006 Pavior's Medal for Excellence has been awarded to Dr Allan Dowson, a long-standing member of the Interpave Technical Committee, for his contribution to paving over 40 years. The Worshipful Company of Paviors has records dating back to 1280, when Paviors were first made responsible for the repairs and cleaning of London's streets and pavements.

Dr Allan Dowson, right, receives the Pavior's Medal

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news »»

streets manual misses a step

Following an extensive consultation process, Department for Transport consultants are now working towards publication of the new Manual for Streets (MFS) in March 2007. Intended as guidelines for all those involved in any aspect of designing streets, MFS will replace Design Bulletin 32 and focuses on residential and other lightly trafficked streets – seeking to create attractive, safe and well designed residential environments. Interpave was involved with the consultation and welcomes the drive to transform street design from being determined solely by traffic movement to encompassing the needs of pedestrians and cyclists – as well as the built environment. This design process should include urban designers, architects, landscape designers and residents, as well as engineers.

However, Interpave has real concerns that the Manual in its current form may not be taken up by the majority of highway authorities. Whilst it calls for departure from a range of other currently accepted standards and recognised practice, MFS fails to provide designers with the reassurance of new detailed guidelines to replace them – or at least recommendations that these standards should be changed. There is a real danger that engineers and urban designers will feel exposed when trying to apply MFS on the ground, even if they thoroughly agree with its core aims.
The first draft is very good at highlighting many of the barriers to change encountered in pursuing good, sustainable design – but then fails to address them. Hopefully, the authors will take these comments on board for the final version.

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shared surfaces debate

One of the central concepts of the draft Manual for Streets is encouragement of 'shared surface' public spaces, often involving replacement of stepped kerbs with level surfaces, perhaps delineated by different paving materials. In addition to removing dominance of the car, this approach makes life easier for many pedestrians as well as wheelchair users. But there are serious concerns that it puts blind people at risk with the removal of easily recognised raised kerbs.

These concerns – raised by the charity Guide Dogs for the Blind – have been receiving substantial press coverage of late and are likely to lead to revised guidelines, possibly in the new Manual for Streets. Irrespective of whether some form of kerb or other recognisable detail is eventually favoured, precast concrete is the ideal material to give the consistency of surface characteristics and predictable colours and textures essential for successful implementation. Interpave will be advising on this situation as it develops and previously published an Accessible Paving guide covering today's requirements, available on the website.

straighten up for 'better backs'

The Health and Safety Executive (HSE) launched its Better Backs campaign in October with workplace inspections, mass media advertising and a range of events. Interpave welcomed this initiative and offers designers and contractors detailed guidance on the safe handling of kerbs and paving flags to help them meet legal requirements.

The kerb guidelines have been endorsed by HSE following a close working partnership with Interpave and are in line with the their own recommendations. Similar guidelines are available for concrete paving flags and both are available to download from the Interpave website. The guidelines include a comprehensive review of the types of handling equipment available, planning the work and use and maintenance of equipment. They offer economic best practice to ensure that handling is in compliance with current legislation.
An information pack on the Better Backs campaign is also available on: **www.hse.gov.uk**.

precast specifications

A brand new *Model Specification for the Installation of Precast Concrete Block Surfaces* has just been completed and is now available as a PDF download from the Interpave website. This authoritative document will be joined towards the end of the year by similar Model Specifications for precast concrete flags and kerbs.

block paving MMC

In the last issue of Pave-It we looked at mechanical laying of concrete block paving on one of the largest ports in Europe. But this technology is growing rapidly on far more modest sized schemes. The ability to deploy a block laying machine and crew at short notice to meet 'just in time' demands is a major benefit – demonstrated by two Award short-listed projects on page 6. Fast, efficient mechanised block laying means earlier completion and less operational downtime of the paved area – not forgetting that block paving can be used immediately after completion without curing times.

To maximise the efficiencies of mechanical laying, installers are examining all the other site processes, mechanising other operations such as laying and screeding the laying course, and compaction. After all, concrete block paving meets today's 'Modern Methods of Construction' requirements for fully engineered, prefabricated products – now completed with efficient, mechanised site processes. Interpave will be looking at project case studies involving machine laying over the next few months: look out for them on the website and construction industry press.

design awards

winning ways

The winner of this year's Interpave Award was announced at the high profile Concrete Society Awards 2006 ceremony in London on November 10th. This Special Award was made for design excellence on commercial projects incorporating precast concrete paving and kerbs. In addition to the winner shown opposite, two other projects were commended by the judges and are covered on pages 8 and 9. Other short-listed projects are shown below.

Newquay, Cornwall International Airport – designed by Mowlem Civil Engineering for Cornwall County Council

The new aircraft 'Parking Pan' forms an essential component in this increasingly busy airport's expansion plans. Designed to meet the needs of more flights and larger aircraft, such as the Boeing 737 and 767, the Parking Pan was the final phase of current airport expansion and needed to be ready for operators to instigate their Spring trade schedules. The 3,500m² area was installed in just 10 days maximising the capabilities of machine installed concrete block paving techniques and demonstrating the potential for this technology.

Sixfields, Northampton Brownfield Initiative – designed by Halcrow for Northampton Borough Council

Europe's largest concrete block permeable paving scheme for 2006 provides a thoroughly sustainable solution to redevelopment of a disused landfill site in a former gravel pit. Two main car parks and linking roadways, serving the new mixed-use urban development including housing and sports facilities, make use of 52,000m² of concrete block permeable paving. This not only attenuates run-off flow rates but also removes pollutants – particularly important for the adjacent sensitive nature reserve and watercourses including the River Nene.

Refurbishment of Haw Bridge near Gloucester – designed by Halcrow for Gloucestershire County Council

Precast concrete safety kerbs proved important to the successful refurbishment of this elegant road bridge across the River Severn. Substantial and permanent protection of pedestrians, as well as the bridge structure, from vehicles was a central requirement and the precast concrete kerbs achieve this with minimal visual impact. An innovative dowel and epoxy-mortar based design was used to enable the contractors to work directly off the bridge deck.

Orpington Bus Depot – designed by Penson Architects for Metrobus

Existing concrete and asphalt pavements required replacing in this busy depot. Machine laid concrete block paving minimises operational 'downtime' in critical applications, avoiding the curing times needed for insitu concrete. Unlike asphalt, concrete block paving is unaffected by oils and other spillages encountered in such applications. Some 7,000m² were laid in sections without disruption to bus services. This project also offered a clear demonstration of the ability for block paving to be lifted and re-laid without scarring, when barriers were installed after the block paving.'

Wales Millennium Centre Cardiff

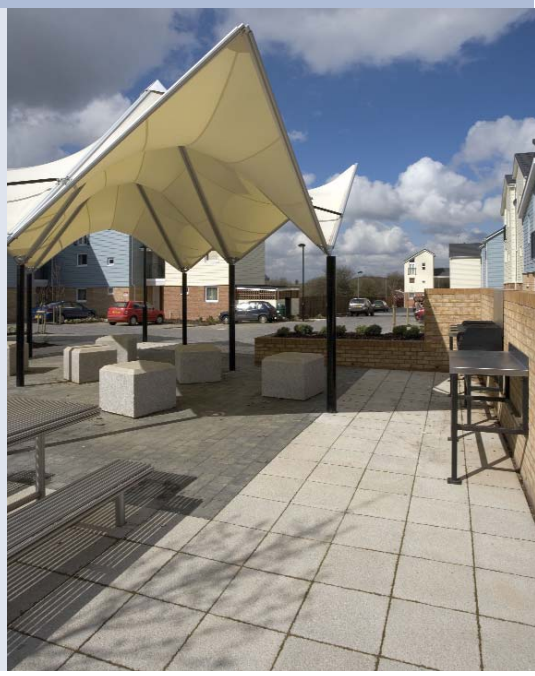
designed by Fira Landscape Architects

WINNER

The Wales Millennium Centre is a showpiece cultural centre for Wales and home to seven of the country's leading arts and cultural organisations, creating a remarkable self-contained artistic community. The landmark building – designed by Capita Percy Thomas – incorporates a 1,850 seat auditorium and makes use of materials inspired by the Welsh landscape. Some 2,000m² of hard landscaped pedestrian areas were designed to reflect the building's rich use of materials and link it to the wider Cardiff Bay area. A special precast concrete flag – developed for the City of Cardiff and incorporating granite aggregate with mica particles for a glinting appearance – was used in conjunction with stone setts to form a chequerboard design.

The judges were impressed with the straightforward but effective design approach and commented that it gives a strong, un-fussy appearance. The hard landscaping acts as an effective foil to the big, bold building and integrates seamlessly with the whole Cardiff Bay redevelopment area. The scheme is entirely appropriate to an important public realm building of national significance and a worthy winner of the Interpave Award.

About the Interpave Award



As part of the prestigious, annual Concrete Society Awards, Interpave sponsors a special award to promote the use of precast concrete paving and kerbs. This award focuses on outstanding design incorporating precast concrete products in recently completed, visually attractive projects.
Any type of commercial (i.e. non-domestic) project in the UK that contains a significant proportion of precast concrete paving and/or kerbing products can be put forward for the Award by members of Interpave.

SPECIAL COMMENDATION

Debut @ Willans Green, Rugby

designed by James Blake Associates for Redrow Homes

Debut is a new generation of first-time-buyer homes designed to meet the government's £60,000 sale price target. Sustainability is also important with homes BREEAM A-rated and the landscaping design needed to reflect this. Sustainable precast concrete paving was used extensively, including products which used copper slag alternatives to virgin aggregates, as well as recycled water and paper during manufacture. The landscape design uses a complementary palette of precast concrete paving flags, blocks and kerbs with different colours, patterns and textures. Distinct areas of different scales and character aim to meet homeowners' practical requirements, while maximising visual interest and 'liveability'.

The judges were keen to commend this project as an excellent example of what can be achieved in the context of affordable housing. The project demonstrates an unexpected quality with real attention to detail, providing residents with a safe, practical and stimulating environment.

The Award Judges

Each year, Interpave invites a panel of expert judges representing a diversity of perspectives and interests in the paved environment.

The 2006 judges were:

Paul Finch OBE – Deputy Chairman of the Commission for Architecture and the Built Environment (CABE) and Editor of The Architectural Review.

Diane Millis – Editor of the Landscape Design Trust magazine Green Places.

David Spencer – retired Chief Executive of the British Association of Landscape Industries (BALI).

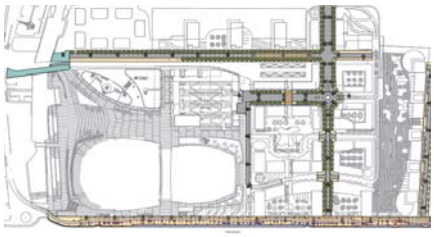
SPECIAL COMMENDATION

Kings Waterfront Infrastructure, Liverpool

designed by EDAW for Liverpool Vision, English Partnerships, Northwest RDA and Liverpool City Council

The 1km long Riverside Promenade plays a pivotal role in the redevelopment of the redundant Kings Dock to create a visitor destination of international quality, offering a mix of uses including arena, conference and exhibition facilities. A distinctive 'barcode' paving pattern is generated using a special 'Liverpool Mix' of silver and mid-grey precast concrete units of differing sizes in varying bands. Unique seating bollards were also incorporated in clusters along the Promenade as an integral part of the paving design.

The judges considered this an exemplary scheme worthy of commendation for its design innovations. It offers a robust design solution to match a sometimes-inclement environment and the barcode theme works well to resolve a long, thin area of paving. The seating bollards rise up from the paving effortlessly and suggest traditional quayside forms reminiscent of the site's history. The Kings Waterfront Promenade sets a standard of public area that should be expected of a City of Culture and could be rolled out across Liverpool to replace low quality pedestrian areas in the city centre.



paving costs research

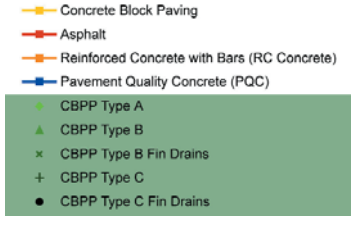
clearing up costs

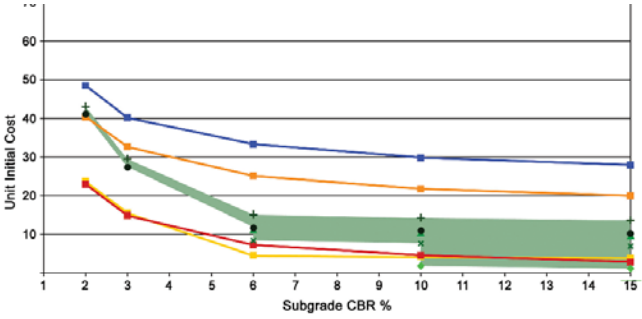
Comparative cost research commissioned by Interpave and carried out by specialist consultants Scott Wilson provides the most up-to-date and comprehensive guidance for paving designers and demonstrates the advantages of concrete block permeable paving (CBPP).

"Concrete block permeable pavements proved the most cost effective paving solution over 40 years."

The research project started with an investigation and comparison of pavement and drainage construction requirements, comparing various pavement types for different applications and a range of ground conditions, initially to provide their initial construction costs. Where possible, Scott Wilson used projects where they had originally been appointed as designers so that designs were realistic, reflecting local topography and drainage requirements. These projects were then redesigned and more than 250 different scenarios were considered including supermarkets and other car parks, estate roads for housing and industrial developments, parking for warehouses, container yards and airport 'airside' pavements.

Designs were undertaken in accordance with current British Standards and/or other appropriate design methods and guides. For impermeable types of paving the same on-site drainage systems were used. Drainage regimes were then redesigned to suit the three recognised types of CBPP, resulting in no drainage costs for 'System A' where full infiltration of water is possible to ground that has good permeability. Appropriate drainage components were added for 'System B', which allows partial infiltration with some collection, and 'System C' where the pavement construction contains all the water for transfer to other SUDS devices. For a range of different application types, initial costs per square metre were plotted in graphs for each pavement type related to a range of soil conditions in terms of California Bearing Ratio (CBR) values.





Typical comparison of Initial Costs, in this case for supermarket car parks.

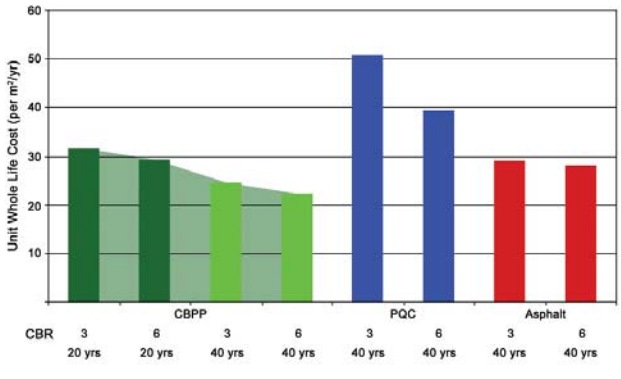
TAKING THE LONGER VIEW

The second stage involved applying whole-life cost (WLC) analysis – a useful tool for an owner or operator to establish the most appropriate design and maintenance solution for a given asset. WLC analysis was carried out for three of the previously assessed pavement types applied to four applications, all chosen to represent markets particularly suited to block paving and where its value may not yet be fully recognised. In each case, two alternative subgrade conditions were considered – a 3% CBR value representing a fairly poor quality of subgrade and 6% CBR for a reasonable quality.

Summarising the results, where ground conditions allow full infiltration System A CBPP provides the lowest initial costs in all cases. With poor ground conditions, the situation varies from one application to another but CBPP Systems B and C are shown to be competitive in all cases. From a Whole Life Cost perspective, CBPP proved to be the most cost-effective paving solution for all four applications considered. But it should be remembered that the most expensive CBPP option, System C, has been used in this analysis and Systems A or B would allow further significant reductions in WLCs. In addition, the design lives for permeable paving used in the research have intentionally been extremely conservative and form the upper boundary of WLCs which could be expected in practice.

By taking into account drainage requirements, the cost benefits of concrete block permeable pavements (CBPP) – both in terms of initial construction cost and whole life costs – have been clearly demonstrated.

A summary document – available as a PDF download – includes useful background on WLCs for pavements and reviews of the different demands for various applications. The research reports can also be downloaded in full – all from the Interpave website.



An example of Whole Life Cost comparison, again for supermarket car parks.

the interlay page

the latest training for paving

TRAINING FOR PAVING

The paving industry as a whole recognises the current skilled workforce shortage. In response, the Hard Landscaping Training Group, an initiative funded by CITB and supported by Interlay and other industry organisations, is running a programme of introductory one-day courses covering installation of block paving, flags or kerbs. The one-day courses are being held weekly around the UK – including Northern Ireland – until the end of the year.

The Hard Landscaping Training Group (HLTG) is an employer-led group committed to developing skill levels and to increasing the pool of competent installers in order to cope with the ever-changing and busy paving and landscaping industries. This programme of

Tony 'www.pavingexpert.com' McCormack delivering a theory session at one of the recent introductory courses

training courses is supported and sponsored by Interpave members together with other manufacturers and suppliers. Courses combine theory with practical sessions for hands-on experience and demonstrations of how to 'get it right'.

Building and maintenance contractors, landscapers, local authorities, builders merchants and colleges are encouraged to put forward personnel – 18 years of age or older – for this important training. The one-day course costs £60 + VAT each, and have been well-subscribed, although there are still some places left left this year. With continuing popularity, HLTG aims to hold more courses next year, as part of this introductory programme: watch the HLTG and Interpave websites for more news.
The Training Group also offers a wide choice of other courses in a range of subjects, from practical skills, health and safety, supervisor or team leader and management training. Special courses can also be tailored to meet the specific needs requested by contractors and other organisations. Many of the Group's courses are recognised by CITB or Lantra, which are sector skills councils – one for the Construction industry the other for Land Based industries. For information on this latest programme of courses, the HLTG and other training contact Kath Walker, Group Training Officer on 0845 2607609, email: **hardlstg@btinternet.com** or visit the website: **www.hardlandscapetrainninggroup.co.uk.**

EXPANDING MEMBERSHIP FOR BETTER QUALITY

Interlay has launched a campaign to increase its membership and provide an enlarged national network of expert block paving contractors.

Insisting on an Interlay member offers specifiers, clients and main contractors alike the reassurance that the installer will have the right skills, resources and training.
The Interlay membership covers all areas of paving from domestic to heavy industrial – including permeable pavements and machine installation techniques. Whatever size of organisation, Interlay members are all experienced contractors with specialist capabilities in block paving, a proven track record and the ability to meet the highest standards of workmanship and service. To ensure that these criteria are met, stringent application procedures are in place including interviews, inspection of completed projects and the taking-up of references. Applicants for membership of Interlay must also have been trading for at least two years.

Interlay maintains an up-to-date list of members, which is now recognised by clients, specifiers and contractors as an invaluable source of reliable, experienced laying contractors. Increasingly, specifications stipulate that paving contracts must be carried out by Interlay members to ensure quality standards are met. Full details of all Interlay members are available on the Interlay website, which identifies those specialising in larger commercial projects and machine installation.

PROJECT SHOWCASE

Interlay has been running its 'Job of the Month' competition throughout 2006 – just three examples are shown here. But the 'Best Job of the Year' will be selected from all the monthly winners and announced at the Interlay AGM early next year. Last chance for Interlay members to enter their best projects now!

Gary Cooper Paving Ltd

Dreamscape Paving & Landscaping

Everest Ltd

precast concrete kerbing today

Kerb appeal

Precast concrete kerbs are the unsung heroes of our roads and streets, ensuring the safety of road users and pedestrians, and contributing to the paved environment over many years. It is worth reminding ourselves of their characteristics and capabilities, and how precast concrete can be specified with confidence as a tried and tested solution – unlike some other un-established kerb materials.

The precast concrete kerb industry is best known for an extensive range of well-used 'BS' profiles given in the latest British Standards which are easily sourced and present no problems of compatibility between different manufacturers. But new versions of the kerb solution continue to be developed to meet specific demands – from vehicle containment kerbs to level-access designs for buses.

VARIETY WITH A PREDICTABLE SURFACE

Precast concrete kerbs are available with coloured, textured and profiled surfaces. They offer a complete range of components, whereas alternative materials with limited accessories may result in the need to mix different materials and finishes. In the urban street environment, consistency of texture and slip/skid resistance characteristics is critical – with serious implications for pedestrian safety and accessibility. Availability of the complete range of British Standard accessories in a single material with consistent characteristics is essential for successful urban street design, which can only be achieved with precast concrete.

MODERN METHODS OF KERBING

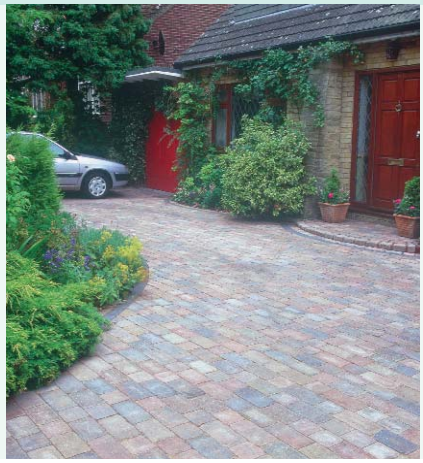
Precast concrete kerbs are mechanically handled and laid on site to optimise efficiency and ensure consistent quality. This approach contrasts with some other kerb products that require substantially more on-site concrete work for support and installation – some alternative kerb products even act as permanent formwork and require substantial quantities of concrete filling and haunching. An extensive array of equipment is readily available to handle precast concrete kerbs to cater for all situations. It has been suggested that some non-concrete kerbs weighing 20kg or less can be manually handled but this is not the case, as the Manual Handling Operations Regulations require assessment of the repetitive nature of the operation and posture during work – not just kerb weight. Misleading claims such as this were discussed in the November 2005 issue of Pave-It.

Highway authorities and other specifiers cannot afford to take risks and should demand consistent, predictable, trouble-free performance of kerbs over the longer term. To give this confidence, kerbs must comply with all aspects of test procedures stipulated in current Standards designed to replicate performance in use over time. The European Standard BS EN 1340, Concrete Kerb Units – Requirements and Test Methods provides this reassurance for precast concrete kerbs.

Interpave has published a new document exploring all the benefits of precast concrete kerbs, available as a printed brochure or a PDF download via the website. Detailed design and construction information as well as comprehensive handling guidance (for both concrete kerbs and flags) are also available on the website.

permeable paving special

where next for sustainable paving?



Interpave continues to drive forward permeable pavement technology and other paving solutions for the sustainable management of rainwater run-off. Some of the latest initiatives are reviewed here, then current topical issues discussed on the following pages.

Concrete Block Permeable Pavements (CBPPs) have been in use in the UK for over 15 years, and longer in other parts of Europe. Comprehensive design and construction guidance is already available – notably via the Interpave website – and extensive research into performance has been carried out. But today we are seeing a rapid growth in popularity of this technology and a wider range of applications where it is being used – fuelled by national planning guidance, Building Regulations and other pressures for more sustainable solutions – discussed on page 14.

As a result, new issues are being raised and designers need to take an holistic approach, assessing how CBPPs fit into existing street regimes – dealing with issues such as construction, maintenance, adoption and service corridors – where necessary, taking a fresh, more sustainable approach.

JOIN THE FORUM

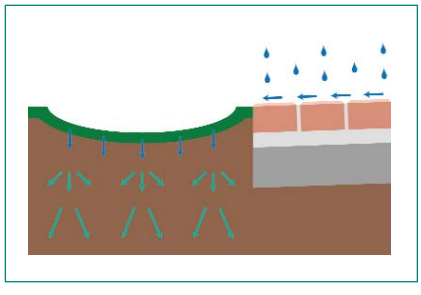
Interpave is committed to encouraging this process and launched a Permeable Pavements Forum earlier this year, inviting questions and comments from designers and making available an 'FAQ' document via the Interpave website, enabling designers to make wider use of the technology with confidence. The answers provided reflect best current practice, pooling information from a number of experts and documented research. Questions, comments and other contributions are welcomed via e-mail and the FAQ document is available as a PDF download via the News section of www.paving.org.uk. The Forum has already been well-used and the issues raised will be included in future guidance.

COMPREHENSIVE GUIDANCE COMING SOON

A fully updated, new Edition 4 of Interpave's *Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements* is nearing completion. This will provide the definitive, authoritative guidance for pavement designers, incorporating lessons learnt from the Forum and case studies (covered in Interpave's current Permeable Paving Projects document). Publication of this essential guidance will be announced on the Interpave website, where various other, current documents can also be downloaded.

RESPONSIBLE RAINWATER MANAGEMENT AROUND THE HOME

In response to concerns raised by planning authorities, the Royal Horticultural Society and other bodies about the sealing up of front gardens for car parking, Interpave is developing important guidance. A brand new design and construction document for drives, patios and other paving to encourage sustainable drainage in the domestic environment – in essence, to avoid putting rainwater into the drains wherever possible and ideally put it to good use. Targeted at homeowners, landscaping contractors and builders, it will offer straightforward and easy-to-follow guidance based on fully engineered solutions. Guidance on suitable plant types for rain gardens is being provided by BALI.



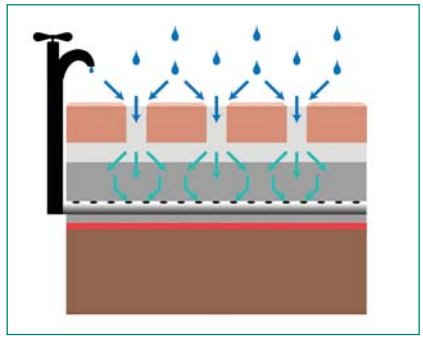
Two basic techniques will be included. Firstly, use conventional block paving for drives and larger patios, and slope it so that water runs onto the garden. A depression in the garden is formed to allow the water enough time to soak into the ground, known as a 'rain garden', with the following alternatives:

1. simple infiltration to the ground
2. with an additional stone trench for infiltration
3. with a pipe in the stone trench, leading to drains

Alternatively, concrete block permeable paving can be used with:

4. infiltration to the ground, or
5. discharge to drains

Other options will also be included, for example covering rainwater harvesting for irrigation.



The guide document will be available shortly as a PDF download from the Interpave website – watch the News pages for further details.

SUDS law

Sustainable Drainage Systems (SUDS) and Concrete Block Permeable Pavements (CBPP) seem to be encouraged by government at every opportunity. But are the requirements for SUDS in developments fully understood and being met in reality?

SUDS aim to replicate the natural drainage pattern of a site prior to development and to reduce pollution, flow rates and water volumes – so minimising impact on watercourses. Traditionally, the SUDS approach involves combining and linking a number of different techniques – such as green roofs, grassed filter strips and swales, infiltration devices and basins, storm water wetlands, ponds and, of course, CBPPs – as a 'management train'. But CBPPs can also be used in isolation – particularly with full infiltration to the ground or with minimal additional SUDS techniques to slow down and clean up before discharge.

JOINING UP REGULATIONS

SUDS are promoted in a wide range of recent documents including the draft Code for Sustainable Homes and Manual for Streets but the obvious legal route to impose them is via Building Regulations. For England and Wales, Approved Document H requires that surface water drainage should discharge to a soakaway or other infiltration systems – but only 'where practicable'. Otherwise discharge can be straight into a watercourse or, if that is not practicable, to a sewer – not a sustainable position. Things look more promising in Scotland where SUDS are particularly encouraged and the new Mandatory Standard 3.6 requires that: 'Every building, and hard surface within the curtilage of a building, must be designed and constructed with a surface water drainage system that will have facilities for the separation and removal of pollutants' – an ideal application of CBPP.

At the earlier planning stage the government seems more committed to enforcing sustainable drainage – but does this happen in practice? In England, two separate sets of planning policy documents are most relevant. PPG 25 applies to flooding and requires local authorities to include SUDS within their local planning policies as well as persuading developers to incorporate them in proposals. This document is being replaced by a new PPS 25 later in the year, likely to include further encouragement and a complete section on SUDS. In Wales a similar Technical Advice Note TAN 15 is in place. Another Planning Policy Statement, PPS 23, takes a similar approach in relation to pollution. But in Scotland, a dedicated Planning Advice Note 61 covers all aspects of SUDS, essentially considering planners to have a central co-ordinating role in getting SUDS accepted as an integral part of the development process. Apart from setting policy, planners are seen to have a key role in the implementation of SUDS through the development control (planning) process. In particular, developers must submit a detailed drainage strategy as an integral part of the outline planning application – not just at the detailed planning or Building Regulation approval stages.

But there is still a danger that, despite early plans for their inclusion, SUDS could fall by the wayside during development – often as part of a cost-cutting exercise. To resist this, sustainable drainage measures including CBPP can be required as a specific planning condition or form part of a 'Section 106' agreement (likely to be replaced by the Planning Gain Supplement system) binding the developer to their inclusion. This approach is positively encouraged in the planning guidance documents such as PPG 25 and PPS 23 and removes reliance on overworked Building Control Officers to argue the case for SUDS at a later stage. This situation provides planners with an ideal opportunity to insist on sustainable drainage and permeable pavements, so making a real difference to our environment.

Interpave will shortly be publishing a guide to increase awareness of the legal imperative for use of permeable pavements, including planning and adoption issues. Look out for this important document on the Interpave website.

COMPLIANT PERMEABLE PAVING

Legislation, guidance documents and regulators not only encourage SUDS and permeable pavements but also set requirements for their implementation. The most important are listed here (with thanks to Peter Coombs).

Pan-European: starting at the highest level, the Water Framework Directive (EUWFD) encompasses both ground and surface water throughout Europe.

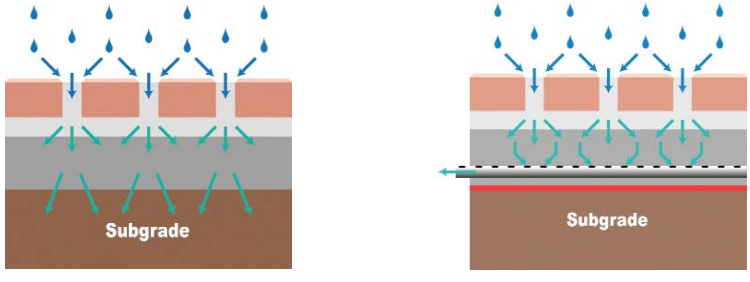
National and Local Development Control: planning and building regulations as discussed in the main article, as well as Regional and Local Plans.

Environmental Regulators: such as the Environment Agency and Scottish Environmental Protection Agency.

Local Drainage Authorities: sewers for Adoption, 6th Edition (2006) includes a clause on SUDS that refers developers to the Interim Code of Practice for SUDS and CIRIA guidance.

Highway Authorities: permeable pavements are now being adopted and the practical implications – such as handling below-ground services – will be discussed in Interpave's guidance document.

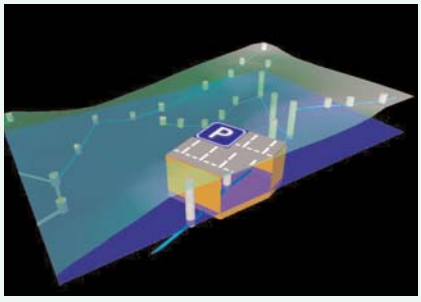
CIRIA Guidance: various documents should be consulted including C582, C624 and C635. In particular, C609 Sustainable drainage systems (2004) covers hydraulic, structural and water quality advice.



Concrete block permeable paving for infiltration...or containment of water run-off for piped removal

permeable software

Peter Coombs argues the case for industry standard drainage design software to determine the hydraulic design of permeable pavements.



Peter Coombs is a Chartered Water and Environmental Manager on the management team at Micro Drainage Limited. He has over 30 years civil engineering experience in the UK and Middle East, and specialises in drainage – particularly SUDS.
His drainage experience ranges from the design and implementation of various foul and surface water capital works programmes during the 1970s & 80s, all involving tunnelling, through to sewers for adoption on new developments in which SUDS are now being integrated.
He regularly trains engineers in the design of a variety of drainage structures in courses that are recognised by professional institutions as a contributor to Continuous Professional Development.

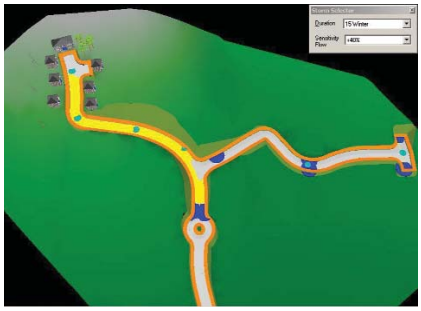
Developers need to assess the impact of their projects upon the existing hydrology and test the robustness of their drainage design for extreme events and climate change. At first glance, to satisfy all the relevant legislation and stakeholders' requirements (listed on page 14) appears to be very onerous but compliance can be achieved through a systematic design approach, the use of proven SUDS techniques, fully trained staff and the latest industry standard software.

Permeable pavements can assist developers comply with the need to minimise the impact of hard-standing areas within high-density developments by mimicking the pre-development run-off regime as well as aiding water quality. The benefit of using industry standard drainage design software to not only design permeable paving but also to be able to incorporate SUDS structures within the overall drainage network means that the whole drainage system can be modelled and tested to satisfy all criteria and all parties.

Through the use of drainage design software, engineers now have the ability to segment a development and design storage or SUDS structures for the sub-catchments prior to testing. This enables the development's upstream and downstream run-off regime to be analysed before incorporating into the drainage model. The engineer can highlight the critical storm durations for each structure and illustrate the effect of one upon the other, providing clarification and a better appreciation of how the whole catchment will interact under a variety of storm events. The critical storms for each sub-catchment can then be assessed and the extreme events resulting in 'exceedance' controlled.

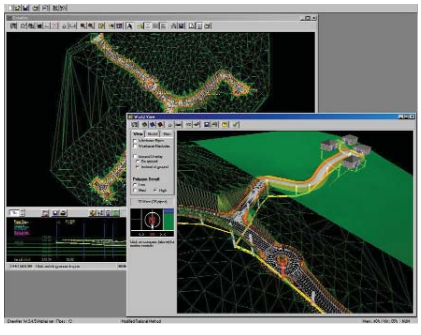
A **Systematic Approach** to the drainage design covering all requirements should include these steps:

- Check for the 1, Qbar, 30 and 100 year pre-development/greenfield run-off.
- Check the pre-development/greenfield run-off volume for the 360 min storm duration, 1 in 100 year return period.
- Design the conveyance drainage to provide capacity for the 1, 2 or 5 year return period.
- Incorporate storage/infiltration to ensure no surface flooding for the 1 in 30 year return period.
- Control the offsite discharges to the 1, 30 and 100 year pre-development/ green-field run-off.
- Check the difference in run-off volume between pre and post-development for the 360 min storm duration, 1 in 100 year return period.
- Control/convey the difference in volume balance into long term storage, ideally through infiltration, or release at a controlled rate of 2 litres per second per hectare back into the network.
- Check the post-development discharges and system performance for the 1, 30 and 100 year return periods.
- Check for climate change, 100 year +10% (to 2080), 100 year +15% (to 2110).
- Control the overland flow to ensure property is not inundated.



There are various benefits in using industry standard drainage design software. The complete drainage network can be designed and modelled and the impact of the new development upon the existing hydrology assessed. In addition, the new drainage network can be tested to exceedance and the effects of climate change scenarios checked. Up-to-date software ensures compliance with current standards and that the requirements of all stakeholders are met through a systematic approach, without losing design productivity.

A detailed paper covering a Comprehensive and Systematic Design Approach was presented at the 3rd National Conference on SUDS, Coventry University, 2005 (A. Millerick) and can be downloaded from **www.microdrainage.co.uk**.



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