



planning with paving

PRECAST CONCRETE
SUSTAINABLE PAVING
IN URBAN DESIGN



Interpave

THE PRECAST CONCRETE PAVING
AND KERB ASSOCIATION



www.paving.org.uk

Foreword

Our streets and public spaces are the one public service we all use every day. Well-designed, well maintained public spaces have a hugely positive impact on people's everyday lives. People feel safe moving around their local neighbourhoods, parents are happy to allow children to play outside, older people feel safe crossing the roads and people are healthier by choosing to walk to the local shops. In short, well-designed public spaces bring communities together.

This is increasingly recognised by national Government and by local authorities across the country. At last, we are seeing a dramatic move in favour of good urban design and a focus on the place shaping role of local authorities through successive planning legislation and guidance. New tools such as *Manual for Streets* highlight the need to plan and design spaces that prioritise people and create a sense of place. Interpave's *Planning with Paving* provides important and timely guidance for all those involved with shaping public spaces and makes a convincing case for the careful specification and design of paving, taking into account a wide range of criteria.

The paving industry is a key player in improving our streets and public spaces, and turning some of the supportive policy agenda around place shaping and planning into good practice on the ground. Interpave guidance such as this document will prove invaluable in helping to achieve this. The partnerships that the industry has in place with local authorities is delivering real improvements to people's everyday lives, and Living Streets is proud to work in partnership with Interpave and its members in delivering our vision of safe, attractive and enjoyable streets and public spaces.

Tony Armstrong

Chief Executive, Living Streets

Living Streets is the national charity that stands up for pedestrians. With our supporters we work to create safe, attractive and enjoyable streets, where people want to walk. We work with professionals and politicians to make sure every community can enjoy vibrant streets and public spaces.



Acknowledgements

In the preparation of this document, Interpave has referred to guidance from various organisations involved with developing thinking in this field, as well as government, in particular the Commission for Architecture and the Built Environment (CABE).

Front cover photos:

Upper right – Precast concrete paving with a honed decorative finish, used internally at the O₂ Arena, London.

Upper left – Tumbled concrete block paved carriageway with traditional concrete kerb and flag footway.

Lower left – Thoughtfully designed and well-executed modular use of precast concrete paving.

Introduction

This document is targeted at all those involved with the development process – particularly designers, developers and planners. It explores current changes in approach to planning, urban design and ‘place shaping’, encouraged by government and other organisations, and fleshed out in adopted guidance such as the *Manual for Streets* (Department for Transport, 2007). Focusing on external surfaces, it makes the case for precast concrete paving as a modern, flexible and sustainable material capable of meeting the latest planning policy demands. It then goes on to demonstrate techniques and best practice for using precast concrete paving to create vibrant and accessible external spaces for sustainable communities.

The Changing Face of Precast Concrete

The use of segmental paving laid to create a hard surface for roads can be traced back over 6,000 years and precast concrete paving continues this tradition today. Concrete paving flags have been used as an alternative to stone for at least 100 years and concrete kerbs in place of granite for 70 years. Use of concrete blocks for paving started at the end of the nineteenth century, but cost-effective mass production in Holland after the Second World War led to a rapid growth in popularity, which spread to Germany in the 1950s, then the UK and other countries in the 1970s.



Unlike other paving materials, precast concrete products are engineered and produced under automated factory conditions to give precise dimensional control and consistent performance characteristics, making them safe, durable and problem-free. However, this engineered approach also impacted on their visual characteristics during the 1970s and 1980s with repetitive shapes, simple patterns and single pigmented colours – often inappropriate for the urban environment. More recently, Interpave manufacturers have completely transformed precast concrete paving and kerb products with a palette of designs, colours and textures offering a visual richness and huge design choice atypical of mass production – and with a quality suitable for the very best in current urban design, whether traditional or modern.

In addition, precast concrete paving from Interpave manufacturers is demonstrably **sustainable** paving – in every sense. As well as having a low environmental impact, products are locally manufactured, making a vital contribution to local employment, economy and community. Also concrete block permeable paving – an important sustainable drainage systems (SUDS) technique – helps in the fight against flooding, while offering a similar diversity of styles as other precast concrete paving.

These and other factors justify taking a fresh look at precast concrete paving.



Interpave's Role

Interpave represents all the major precast concrete paving manufacturers in the UK. Its block paving manufacturer members maintain the highest standards of quality control, product innovation and sustainability and are signatories to the British Precast Concrete Federation *Sustainability Charter*. Interpave has the expertise and resources to provide the definitive guidance on all aspects of precast concrete paving and works alongside other organisations, such as the British Standards Institution and Health and Safety Executive, in taking the industry forward. Its manufacturing members continue to develop innovative products and systems, and to work in partnership with designers and local authorities in meeting their specific demands.

Planning and Place Shaping

The Planning Framework

Instigated by the 2004 planning reforms, government continues to encourage a shift away from planning as a narrow regulatory system, towards a positive way of shaping places and communities. This approach requires local planning authorities (LPAs) to take on the role of 'place shapers' both in producing local policies and in determining applications for development. The introduction of local spatial plans in 2004 sought to foster positive 'place making' and this aim will continue with the new system of Local Development Frameworks launched in the 2007 white paper *Planning for a Sustainable Future*.

Under the new regime, LPAs will be able to exercise their place-making role with more flexibility using Supplementary Planning Documents such as master plans and design codes. The development of design codes for external spaces and assessment of individual designs will be informed by the *Manual for Streets* (MfS), described by government as: 'good practice guidance... issued by Communities and Local Government to augment policy...'.

Manual for Streets

MfS replaces the 30-year old *Design Bulletin 32* and focuses on residential and other lightly trafficked streets, although it is also considered applicable to other areas such as high streets. Originally applying only to England, MfS has been endorsed by the Welsh Assembly and is strongly referenced in its own policy. Similar guidance is also in preparation for Scotland. In terms of procedure, it confirms that there should be design and access statements for all schemes, with master-plans and design codes for major projects and larger areas, to ensure coherence and local character. Local authorities are strongly recommended to review their standards and guidance to embrace the principles of MfS.

The central aim of MfS is to create attractive, safe and well-designed residential environments, setting out a 'manifesto for better design, streets and communities'. The guidelines prioritise pedestrians over cars, with more emphasis on urban design than traffic engineering. MfS promotes a traditional grid of streets defined by buildings to give a 'permeable' network, particularly for pedestrians and cyclists. Streets are now regarded as places for people and the heart of neighbourhoods, not arteries for the flow of vehicles, heralding the wider use of shared spaces and surfaces already seen in Home Zones.

Although it does not prescribe materials and detailing, MfS expects local authorities to be 'encouraging innovation with a flexible approach to... the use of locally distinctive, durable and maintainable materials...'. It encourages use of local materials



for both aesthetic and sustainability reasons and highlights the importance of predictable long-term performance for problem-free adoption. It acknowledges that the choice of surface materials has a large part to play in achieving a real sense of place, encouraging LPAs and highway authorities to develop a limited palette of materials within design codes or other local design guidance to simplify maintenance and adoption issues, as well as give local character.

Another important MfS approach is generally to clear away the visual 'clutter' of excessive signage, using instead other design features, such as variation in surface materials, colour or texture. This approach helps make the environment self-explanatory to all users. Despite a change in emphasis towards design quality, safety remains an important issue and: 'Surfaces need to be smooth and free from trip hazards. Irregular surfaces such as cobbles... are unlikely to be appropriate'. Sustainable Drainage Systems (SUDS) are also encouraged by MfS for use wherever practicable and seen as one of the key features to be addressed in master-planning, as well as in local design codes. Sustainability generally is also considered important for choice of materials, including consideration of manufacturing processes and energy use.



Regeneration of Blackwood, Caerphilly – a 2004 Interpave Awards winner



A Home Zone scheme in Portsmouth

Home Zones

Home Zones are residential streets or groups of streets where people and vehicles share the whole road space safely and on equal terms, although the motorist should feel like a 'guest' in the area. They are designed so that quality of life takes precedence over ease of traffic movement and they aim to promote neighbourliness and a sense of security. Although based on the same principles as *Manual for Streets*, Home Zones are distinct and specifically defined in law. Various guidelines and experience in use over several years offer comprehensive design information, although research continues on aspects such as the safety and accessibility of blind and visually impaired people using shared surfaces.

Home Zones need to be designed as vibrant public spaces to accommodate play, exercise and relaxation by residents including children, the elderly and disabled people. They should be individually designed to give a sense of identity and community. They must create a safe and secure environment while enabling vehicle access and parking. Home Zones should be integrated with the surrounding area to provide a network of routes for pedestrians and cyclists, whilst dispersing vehicle traffic evenly.

Other Guidance

Other useful design guidance for urban areas is also available, such as *The Urban Design Compendium* (Homes



Varied length paving blocks at the West Somerset Railway Minehead Station

and Communities Agency, 2007-2009) and *Civilised Streets* (CABE, 2008), while various organisations – including CABE and the Prince's Foundation – continue research on different aspects of urban design. In addition, Living Streets focuses on improving the existing streetscape, largely for the benefit of pedestrians.

All these initiatives share the basic principles of the *Manual for Streets*. More specific recommendations from these guidelines are discussed later. It is also important to remember that the drive for sustainable communities, development and products is firmly entrenched in planning policy at both national and local levels, and is a critical consideration at every stage.

Sustainable Drainage

Sustainable drainage, using techniques such as concrete block permeable paving, is an important aspect of place shaping and is already entrenched within national planning policy. PPS25 – *Development and Flood Risk* applies to England and requires LPAs to give priority to SUDS when determining planning applications as well as placing responsibilities on developers to incorporate SUDS to reduce flood risks. It also requires both regional and local planning authorities to further the use of SUDS. Apart from flood risk, the role of SUDS to improve water quality is recognised in PPS 23 – *Planning and Pollution Control*.

In Wales, Technical Advice Note (TAN) 15 – *Development and Flood Risk* – takes a similar stance to PPS 25 but goes further: developers will need to give good reason why SUDS could not be implemented. If a conventional drainage system does not improve the status quo or has a negative impact then this can be a valid reason for refusal of planning applications. In Scotland, comprehensive advice covering all aspects of SUDS is contained within a single Planning Advice Note (PAN) 61 – *Planning and Sustainable Urban Drainage Systems*. This clearly requires planners to have a central co-ordinating role in getting SUDS accepted as an integral part of the development process.

Essential requirements for paving materials, from *Manual for Streets* and other guidelines, can be summarised as follows

- visually attractive able to deliver distinctive local character
- capability for visual or tactile differentiation between distinct areas
- durable and maintainable with reliable product supply
- accessible to all with consistent slip and skid resistance
- well drained to avoid standing water and compatible with SUDS
- sustainable – in the widest sense

Precast concrete paving is uniquely placed to satisfy all these requirements.

Precast Paving Principles

In the previous section, we have seen how adopted guidelines such as the *Manual for Streets* are linked to current and imminent planning policies, and the positive place shaping role of planners via design codes. This section aims to demonstrate how modern precast concrete paving and kerb products from Interpave manufacturers meet all the requirements of these guidelines, opening the door for their addition to design codes and specification on a wide range of projects.

Visual Characteristics and Design Flexibility

With precast concrete paving and kerbs, distinct, modular units and designed variations in colour, texture and shape break up areas giving visual interest and a human scale not possible with monotonous, formless materials such as asphalt. In recent years, Interpave manufacturers have transformed this concept, moving away from the simple, regular patterns and colours of the 1970s and 1980s. They continue to expand an extensive palette of styles, shapes, colours and textures to meet current demands in urban design, matching – and often exceeding – the visual qualities of materials such as stone.

In particular, they work in partnership with major developers and planning authorities to develop specific products and finishes to provide distinctive local character for particular areas, which can then form part of local design codes. This is a valid and sustainable interpretation of adopted guidelines. It is generally unrealistic on cost, availability and accessibility grounds to specify locally extracted stone which may have been used in the past, while imported stone fails to meet sustainability criteria.



Regeneration of Bristol City Docks area



Precast concrete flag paving at the Wales Millennium Centre in the regenerated Cardiff Bay area

Predictability and Long-Term Performance

In addition, and unlike extracted materials such as stone and clay, precast concrete products are fully engineered and manufactured under modern, controlled conditions – consistently providing accurate product and joint size, colour and texture, slip/skid resistance and other performance characteristics. So, precast concrete paving offers a unique combination of predictability to ensure safety and accessibility for all, with scope for endless variety in shape, scale, colour and texture to enrich the urban environment.

Specifiers and adoption authorities cannot afford to take risks and should demand consistent, predictable, trouble-free performance of paving and kerbs over the longer term. Unlike similar products which have been imported, such as sandstone or granite, or other materials, such as plastics, precast concrete paving and kerbs from Interpave manufacturers comply with all aspects of test procedures stipulated in the latest British Standards, designed to replicate performance in use over time. For example, BS EN 1338, 1339 and 1340 introduced a more rigorous approach to previous British Standards to provide specifiers with full confidence in the use of precast concrete paving blocks, flags and kerbs respectively. It stipulates that the manufactured concrete must conform to a wider range of performance characteristics, determined on actual manufactured products, including weathering, abrasion and slip/skid resistance, and strength.

Long-Term Availability

Continuing availability of a complete range of products and accessories in a single, predictable material is essential for successful urban design over the long-term. This is simply not



Predictability and consistency are essential for shared surfaces

achievable with imported stone or plastic products, generating potential user-safety issues and product maintenance or replacement problems for the future, which should raise doubts about their adoption. In contrast, as substantial organisations Interpave manufacturers working within the local framework of established standards and regulation easily achieve this aim. Precast concrete paving can be easily reinstated following excavation works, for example to access services, leaving minimal evidence – with any replacement product readily available. It is also worth remembering that all these benefits of precast concrete paving from Interpave manufacturers are available at an economic cost – in both initial and whole life terms.



Sustainability

The recently launched BRE *Green Guide to Specification* provides independent endorsement of the low environmental impact of precast concrete paving, particularly in comparison with imported materials. It rates a wide range of elements from 'A+' for best environmental performance to 'E' for the worst. Three different paving scenarios are considered covering: Pedestrian Areas, including communal spaces, walkways and garden paving; Lightly Trafficked Areas, such as car parking; Heavily Trafficked Areas, for heavier vehicles or repetitive car traffic. The same three scenarios – with identical results – are applied across the six different building types considered by the Green Guide. But the ratings also provide essential guidance for local authorities to exercise their responsibilities for sustainable materials on roads and public spaces unrelated to particular buildings.

The summary environmental ratings for the various precast concrete paving specifications considered are as follows:

Rating	Specification
Pedestrian Areas	
A	50mm thick concrete blocks with no sub-base
A+	35mm thick concrete paving flags with no sub-base
[B]	[100mm thick concrete cellular units for grass with no sub-base. In fact, this specification is unlikely to be used here, as these products are specifically designed for trafficking]
	
Lightly Trafficked Areas	
A+	60mm thick concrete blocks over prepared recycled sub-base
A	60mm thick concrete blocks over prepared sub-base
A+	60mm thick concrete paving flags over prepared recycled sub-base
A	60mm thick concrete paving flags over prepared sub-base
A	120mm thick concrete cellular units for grass over prepared sub-base (using on-site available material)
	
Heavily Trafficked Areas	
A	80mm thick concrete blocks over prepared recycled sub-base
B	80mm thick concrete blocks over prepared sub-base
A+	120mm thick concrete cellular units for grass over prepared sub-base (using on-site available material)
	

These ratings provide independent endorsement of the low environmental impact of precast concrete paving, particularly in comparison with imported materials, helping specifiers and local authorities to make responsible material choices. They also reflect the on-going environmental investments and improvements made by Interpave manufacturer members, as well as by the cement industry generally. Although not considered in the Green Guide, precast concrete kerbs will have similar environmental characteristics to concrete flags, whereas alternative kerbing materials such as plastic remain an unknown quantity.

Local material sourcing and product supply is also a key element of sustainable construction, and equivalent paving products shipped into the country bear a substantial CO₂ emission load over those locally supplied. Some imported stone paving products are also included in the Green Guide – generally with much poorer ratings than their precast concrete equivalents and half with the worst 'E' rating.

More information can be found in Interpave's document: *Environmental Impact of Paving*.

Although many of the on-going environmental investments and improvements made by Interpave manufacturer members are reflected in the Green Guide ratings, they also affect other sustainability issues. All Interpave block paving manufacturers have committed to the *British Precast Concrete Federation*



Textured granite aggregate concrete paving at the Falkirk Wheel

Sustainability Charter, with wide ranging key performance indicators. They have senior managers and directors specifically tasked with executing sustainability policies and continue to explore ways of improving performance in all areas and demonstrating that performance to stakeholders. Recycling, reducing waste and responsible use of resources all form part of this ethos.

It is also worth remembering that their precast concrete paving products are manufactured locally on modern, automated manufacturing plant. Interpave manufacturers form an essential part of the local economy – generating sustainable employment – and community. Localisation also minimises transportation impacts of both manufacturing materials and supplied products, and provides effective national coverage. More information on sustainability issues can be found at: www.paving.org.uk/sustain.



Precast concrete cellular units allow grass growth for a softer landscape appearance while supporting traffic and allowing rainwater to drain through

Concrete Block Permeable Paving

Concrete block permeable paving generally has the same design characteristics as other precast concrete paving and is available in a growing range of styles, colours and textures – in some cases matching impermeable products. It deals with surface water close to where rainfall hits the ground and offers two fundamental benefits: completely level, well-drained, firm and slip-resistance surfaces and an absence of channels, gulleys and other interruptions. As a result, concrete block permeable paving meets current accessibility requirements for the whole community – unlike loose materials such as gravel, suggested in some SUDS guidance but specifically excluded by accessibility rules, such as Building Regulation Part M. It also eliminates ‘ponding’, reducing the risk of ice forming on the surface and avoiding rain splashing from standing water.

Concrete block permeable paving reduces the peak rate, total volume and frequency of rainwater runoff and helps to replicate green-field runoff characteristics from development sites. CBPP is very effective at removing pollution from runoff, unlike conventional drainage systems – which effectively concentrate pollutants and flush them directly into drains, watercourses and groundwater. It is one of the most space-efficient SUDS components available and does not require any additional land-take, making it an ideal solution for urban areas. In fact, it can handle runoff from roof drainage and adjacent impermeable surfaces as well.

The unique characteristics of concrete block permeable paving amongst SUDS techniques will ensure growth in its use on all types of development, in line with government demands. Definitive guidance for designers, developers and planners is available in Interpave’s *Understanding Permeable Paving* document and more detailed information from its sister publication *Permeable Pavements – Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements*.



Concrete block permeable paving which has been adopted by a local authority

Precast Paving Products

Generally, precast concrete paving products can be divided into three categories - paving blocks, flags and kerbs – each subject to a separate set of standards. However, they all exhibit the same slip resistance and many other characteristics, ensuring consistency, safety and accessibility for all users across the whole surface whichever combinations of products are used. However, it is the Interpave manufacturers' impressive diversity of enhanced surface finishes, which can be applied to all products, that singles out precast concrete as the most flexible material for the paved environment.



Tumbled blocks combined with a considered range of sizes and muted colours provide an appropriate setting for historic environments such as conservation areas and listed buildings



Precast concrete paving from Interpave manufacturers offers a huge range of products in modular sizes, colours and finishes for designers to combine

block permeable paving is growing rapidly in popularity as a SUDS technique, which incorporates widened joints to allow water flow while maintaining a similar appearance to impermeable equivalents.

Block Paving

Paving blocks are manufactured in a controlled, factory environment to close tolerances using a relatively dry mix concrete (0.33 water cement ratio). High density and strength are achieved using vibration combined with substantial pressure applied by 'heads' descending into the mould, which also define the top surface. A wide choice of colours and blends can be achieved with high quality pigments. In some cases, a second less-dry mix – perhaps with pigments or other decorative material, provides the top surface. High material strength linked with limited size give each individual block considerable load-bearing capabilities while the flexible joints between blocks allow tiny movements, avoiding the cracking which can occur with rigid surfaces.

In recent years, new designs have been added to the standard 200mm x 100mm block with chamfered edges to give a less regular appearance. These designs can have an irregular or 'weathered' appearance, matching the look of stone setts, cobbles, clay bricks and other traditional surfaces – while costing significantly less and providing better slip resistance and a more accessible surface for all pedestrians. Concrete



Standard concrete block paving can provide a crisp, regular appearance to suit contemporary buildings



Compared with standard chamfered blocks, concrete block paving today can make use of varying sized modular units with a softer edge



A demonstration of the flexible capabilities of concrete flags to shape external spaces

Flag Paving

Precast concrete flags are produced in a wide range of square or rectangular sizes, offering extensive opportunities for different laying patterns. Sizes range from 300 x 300 to 900 x 600 mm, offering designers the potential to use elements of a larger scale than block paving. Flags can be divided into three main categories: standard, small element and decorative. All but decorative are manufactured to BS 7263: part 1 or BS EN 1339 in standard sizes.



Classic precast concrete paving flags can play an important part of urban design, here with tactile paving at crossings and wider footways to improve the pedestrian environment

It is of fundamental importance to design flag paving either for trafficking or for pedestrians only, bearing in mind the potential for service vehicles to override pedestrian areas in some cases. Interpave manufacturers have developed special flags reinforced with fibres to withstand trafficking. Flags can also be manufactured to reproduce the colour and surface texture of natural stone paving in various finishes including riven, split, sawn and tooled, while easy-clean surface finishes can also be supplied. Interpave manufacturers also

supply a full range of tactile surface paving to inform blind and partially sighted people of hazards and routes to facilitate full accessibility, as discussed later. It is important that these are exactly as prescribed in standards to ensure clear, universal communication.



Concrete flag paving can form the basis of a lively and vibrant street environment

Kerbs

Precast concrete kerbs are best known for an extensive range of well-used 'BS' profiles given in the latest British Standards. Unlike other kerb materials, the full, extensive range of components and accessories is available in precast concrete, covering all the highway and urban design features needed today. These are easily sourced and present no problems of compatibility between different manufacturers. Other, non-standard products are also available, such as small element block kerbs and accessories for more informal layouts.



Small element precast concrete kerbs offer additional flexibility with layouts, while factory applied finishes can provide long-term road markings.



Precast concrete kerbs systems are available with integral drainage facilities

New versions of the kerb solution continue to be developed to meet specific demands. For example, high kerbs with special profiles offer a simple, cost-effective system for containing vehicles on the road, contributing towards better road safety and protecting pedestrians. Other precast concrete kerb products have been developed to facilitate access by wheelchair users, people with prams, the ambulant disabled and others onto buses. Here, special kerbs overcome the problems associated with height variance between footway and the various entrance levels of public transport vehicles, while also minimising the gap by facilitating easier, accurate vehicle positioning. The extensive, established precast concrete kerb industry has the resources to continue meeting new demands. Unlike other materials, developments in precast concrete kerbs are simplified by manufacturing techniques that enable bespoke products to be produced without expensive tooling.



Concrete kerb units with a high quality enhanced finish used in conjunction with decorative concrete block paving to give a distinctive character



Interpave manufacturers continue to develop innovative products for accessibility for all such as level access kerbs for buses

Enhanced Finishes

In terms of design opportunities, pigment technology allows a much wider choice of colours today – ranging from vibrant to muted tones – as well as varied mixes of colours that can emulate other materials such as stone or clay. Surface treatments can also be applied to paving blocks, flags and kerbs to give different textures, some exposing the inherent aggregates. Surfaces can be honed for a flat finish or polished, or products shot blasted to look weathered or tumbled for a more rugged, natural appearance.



Tumbled block paving alongside 'granite' finish paving flags



Modern precast concrete paving blocks, flags and kerbs can have enhanced surface finishes such as this shot-blasted texture in 'granite' and 'Cotswold stone' colours

Combining these attributes with the range of shapes and sizes available enables designers to select paving styles ranging from traditional to contemporary, enhancing any environments from historic conservation areas to brand new urban spaces. For more information about the range of products and finishes offered by each Interpave manufacturer, visit www.paving.org.uk/manufacturer_members.php for links to each member's website.



Interpave manufacturers work in partnership with local authorities to develop specific products and finishes to give local identity – in this case, a special paving flag for the Cardiff Bay area redevelopment



Precast concrete paving can also be enhanced with a high quality honed decorative finish, in this case used internally



Concrete block permeable paving is also available from Interpave members with enhanced finishes – such as this shot blasted design

Designing with Precast Paving

Design Techniques

While the *Manual for Streets* and other guidance documents encourage innovation, they also demand consideration of various other criteria when designing external paving. Selection of paving materials to provide 'local character' is considered essential – and may well define the palette of materials set by planning authorities in master plans and local design codes, as discussed earlier.

However, communication is also important so that the design is self-explanatory in terms of both navigation and use of different areas, perhaps involving combinations of different colours, styles, patterns and textures. The traffic speed reduction effects of block paving have been clearly demonstrated, while kerbs are well recognised by all as a vehicle/pedestrian delineator – and still effective when set flush with the paving. However, design restraint may also be needed to avoid a confusing, overpowering design and a balance struck between this and a 'wall-to-wall' appearance of a single paving style without relief.

Precast concrete paving is uniquely placed to satisfy these demands consistently with a huge palette of patterns, product designs, colours and finishes.



In this housing project, colour and pattern are used to differentiate between highway, footway and crossing points, reinforced by a flush kerb line



A simple solution to shared surfaces using just one type of precast concrete paving with no delineation of traffic routes, parking or pedestrian areas



Use of contrasting colour, pattern or texture can delineate routes within shared surfaces while maintaining uniform slip resistance



Creation of patterns – whether symbolic, decorative or playful – is natural with precast concrete paving



Different styles of precast concrete paving products used in conjunction with planting to create a harmonious design at Teesside University



Change of colour reinforced by an inset kerb unit delineates highway from private areas in this shared space



This strong, formal pavement design links a modern building to flanking traditional terraced housing at Teesside University



The traditional high street can be simply transformed with wider footways in high quality materials such as these 'granite' precast concrete flags

Accessible Design

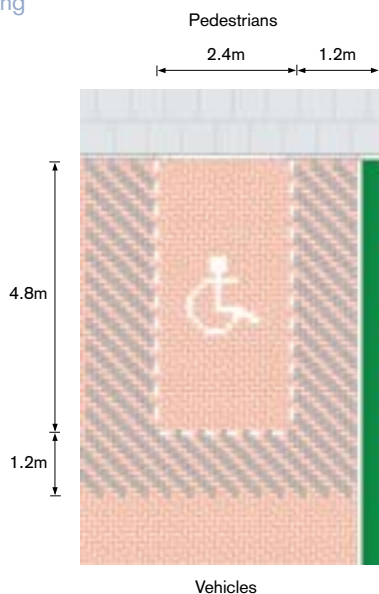
The *Manual for Streets* and other guidance stress the importance of inclusivity and accessibility for all. Whilst there is on-going debate about accessibility and shared external spaces, firm guidelines are provided for other paved areas in BS 8300:2001 *Design of buildings and their approaches to meet the needs of disabled people – Code of practice*. BS 8300 forms the basis of Building Regulation requirements which apply to those features outside the building needed to provide pedestrian and wheelchair access to the building entrance from the edge of the site, car parking, setting down points and (for non-housing) from other buildings on a site. Of course, the design principles involved can also be applied to other external areas to ensure accessibility for all.

Specific guidelines are provided in BS 8300 for on-street parking, off-street parking, 'level' approaches, ramps and steps. It is important that these elements are accurately designed in detail as an integral part of the overall scheme, not left until the construction phase with ad hoc solutions. Interpave's document *Accessible Paving – Precast Concrete Solutions for Building Regulations, BS 8300, DDA and Inclusive Mobility* provides detailed guidance on all these applications.

On-street parking



Off-street parking



Also referring to BS 8300, the Department of Transport's 2002 guide *Inclusive Mobility, a guide to best practice on access to pedestrian and transport infrastructure* deals with other public areas, often away from buildings. It provides extensive guidance including the use of drop-kerbs and tactile paving surfaces. These surfaces, reinforced with the use of colour, have been developed to provide blind or partially-sighted people with specific information. It is essential that the rationalised range of surfaces, summarised here, is used properly and consistently, in accordance with the DETR *Guidance on the use of Tactile Paving Surfaces* and BS 7997 *Products for tactile paving surface indicators*. With precast concrete flags and paving blocks, the detailed profiles, sizes and colours specified can be produced easily and consistently.



Blister Surface

At level or ramped road crossings without a step kerb. Colours – red for controlled crossings only; other colours (preferably buff) for uncontrolled crossings giving good contrast with surrounding paving.



Facing railway lines

Platform Edge (Off-street)

For heavy rail and light rapid transit platforms not in a street environment. Colours – for good contrast (but not red).



Cycles
Pedestrians

Cycle Track & Footway

Used with a central delineator raised line to define pedestrian and cycle sections of shared facilities.



Direction of travel

Corduroy Hazard Warning

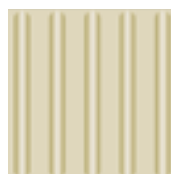
For specific hazards such as steps, level crossings or where a footway joins a shared route. Colours – to contrast with the surrounding area (but not red).



Facing railway lines

Platform Edge (On-street)

For light rapid transit platforms, only within a street environment. Colours – for good contrast, often buff (but not red).



Direction of travel

Guidance Path

Used sparingly to guide people around obstacles, to specific locations or between facilities in transport terminals. Colours – for good contrast (but not red).

All the guidance documents agree that paving surfaces must be:

- Firm, stable and even (not loose materials such as gravel)
- Durable
- Slip resistant
- Non-reflective

Precast concrete flags and paving blocks, used in conjunction with concrete kerbs, easily meet all these criteria. As fully engineered products manufactured under controlled conditions, they consistently provide:

- Accurate sizing with controlled joints to ensure an even surface
- Non-slip characteristics in dry or wet conditions (recognised in BS 8300)
- Proven long-term performance and durability
- Reinstatement without evidence to give an even surface after below-ground work
- Wide variety of colours and textures – particularly for ramps and tactile surfaces – with uniform frictional characteristics.

This impressive choice can also satisfy specific requirements for colour and surface texture, resulting from current initiatives to resolve accessibility issues with shared surfaces.



Correct use of tactile paving is essential to give the right information to visually impaired people

Design Features

The extensive variety of different precast concrete paving products enables designers to use them in combinations, and perhaps with planters, seating and other street furniture, to form specific features within paving projects. Many of these features are discussed in the *Manual for Streets* and other guidance, notably in relation to Home Zones, although they can also be used for other applications. They include:

- Gateways (entrance and exit) to Home Zones
- Different areas of relevance to visually impaired people
- Dedicated car parking spaces
- Traffic junctions without road markings
- Pedestrian routes differentiated from vehicle tracks
- Pedestrian crossing points
- Traffic calming features.

In addition to those shown here, more examples of design techniques, features and layouts from the UK and other countries can be found in guidance documents in the website's Topical Issues section, as well as issues of *Pave-It* magazine – all available from www.paving.org.uk.



Delineation of car spaces using inset kerb units flush within a single style of block paving at the new Upton development, Northampton



A carefully considered use of precast concrete paving to define distinct areas within a Home Zone in Portsmouth



Precast concrete paving provides a change in surface texture and colour to signal pedestrian crossing points, supported by the required tactile paving



Differentiation of paving surfaces with other features is used to form gateways to Home Zones, as in this Bristol example

Layout Design

The key to effective layout design with precast concrete paving products is to optimise their modular nature, by dimensioning areas to minimise cutting and combining compatible products to avoid cutting. With precast concrete kerbs, Interpave manufacturers work closely with designers to make the most of the extensive range of standardised units available and factory-produced specials to minimise on-site cutting. With considered layout design, modular use of various precast concrete paving products can strengthen the visual character of rectilinear schemes, although, of course, they are also ideal for curvilinear or circular patterns.

An important consideration is to anticipate which paved areas will be trafficked by light or heavier vehicles, including overrun areas on corners and service access routes in pedestrian areas. Where occasional trafficking by vehicles occurs, new product developments such as fibre reinforcement ensure that concrete paving flags provide an attractive and safe surface over the long-term while concrete block paving can be used for any areas whether trafficked or not.



Subtle pattern making using varying sizes of paving and edging units in a single finish while optimising modular dimensions and avoiding cutting



In this boulevard design in Bootle, a rigorous modular approach is carried through all the paving and even tree grids to avoid cutting



Introducing a contrasting course where patterns change as well as at edges allows a neat transition where cutting is needed



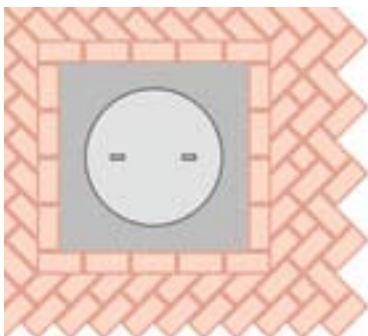
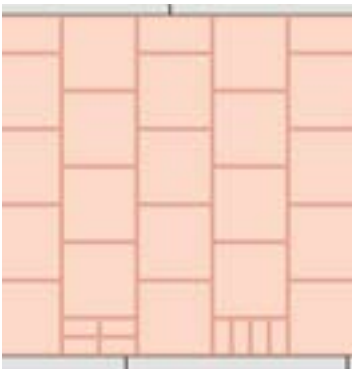
Careful selection of ironwork is essential. Here, special manhole covers have matching paving inset

Detailed Design and Execution

As with any construction operation, detailing of edges, insertions, level changes and junctions within paving should not be left to site operatives but resolved by designers. With precast concrete paving, well-established solutions are readily available from Interpave technical guidance or members' websites via www.paving.org.uk.

These solutions include use of string courses to contain inspection chambers, define edges to paving or separate different curvilinear patterns. Quality ironwork and installation is also important for long-term performance and inspection

chamber covers are available to inset precast concrete paving to match surrounding areas. The *Manual for Streets* recommends that services are segregated within corridors where possible, a technique which is particularly important to keep them away from permeable paving: for more information, visit www.paving.org.uk.



A simple palette of precast concrete paving at the Stirling Prize-winning Accordia housing in Cambridge, made particularly successful by careful detailing and execution



Marshalls



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