The construction industry is increasingly demanding the use of modern automated handling and installation methods to deliver safe working practices and to assist in delivering projects on time and to budget.

Marshalls has recognised this demand and has fully committed to lead the industry in the development of Machine Lay paving solutions incorporating product, plant and installation.

Modern methods of installation of concrete block paving can now deliver new levels of speed, efficiency and quality above traditional installation methods, particularly on larger areas, and positions concrete block paving as an aesthetic, functional and cost effective alternative to other wearing courses.

You can view the Marshalls Machine Lay solution in practice at www.marshalls.co.uk/machinelay

Machine Lay DVD
To order our Machine Lay DVD demonstrating all of the automated processes call our Customer Services Office on 0870 241 2463.

PS3PLUS and NBSPlus references
For the most up-to-date information and NBS specification, please note the codes at the top of each product page and use these at www.marshalls.co.uk/select to download the latest PDF.
Concrete Block Paving

Aesthetics
Marshalls Block Paving creates a visually appealing surface, full of character. The variety of colours, textures, shapes and sizes form a stunning surface to the external environment, creating warm and inviting public spaces as well as durable commercial pavements. Coupled with its durability and strength characteristics, Marshalls Block Paving is ideal for any specifier’s or contractor’s long term surfacing solution.

Strength
The inherent benefit of a Block Paved surfaced is found in the flexibility of the surface course and the interlock between the blocks. This interlock between the units forms structural integrity, allowing loads to be dissipated laterally between units and down through the sub-base. Add this to the basic strength of a single Marshalls concrete block and it is easy to see why this solution is used as a standard in projects with the highest load applications.

Reinstatement
When maintenance of the underlying services is required, concrete block paving shows one of its key benefits, the ability to remove and replace the units after the work is complete like an invisible zip. As the same units are removed and then reinstalled following the work, the surface is undamaged; the blocks are unzipped then replaced as before. An effect which cannot be replicated with bituminous materials whose patchwork impression we see too often in our streetscapes.

Slip Skid Resistance
The texture of a concrete block paved surface, with its joint edges and the actual finish of the block, combine together to give excellent slip skid resistance, even in wet conditions. Over the years block paving has become trusted by specifiers as offering a safe, slip resistant surface for pedestrians and skid resistant surface for trafficked areas.

Whole Life Costs
Over the long term, concrete block paved surfaces are appreciably more cost effective than asphalt or insitu concrete, offering lasting value in the built environment. Marshalls Concrete Block Paving has better long term cost due to the inherent flexibility and strength in the surface, infrequent and simple maintenance, ease of reinstatement following works, and its recycling capability.

In addition, considering the immediate aesthetic impact a Marshalls Concrete Block Paved surface makes to a project; the product clearly stands up as the best overall value choice for both the public realm and commercial users alike.

Traditional Tegula, Oaklands, Rugby
The Machine Lay Solution

Pre-packaged for optimum laying configurations

Process
The Machine Lay solution encompasses a process of automated installation. From the screeding of the sand bedding course, installation of the paving product, compaction through to joint filling; Machine Lay automates all of these processes, assisting in reducing the overall construction period of the pavement.

Product is manufactured in unique machine-installable layers within the pack and is installed on-site by a powered ride-on machine.

In order that the best quality and service is provided, Marshalls has developed close working partnerships with both the plant manufacturers and specialist machine-equipped installers.

Installers
Marshalls has partnered with a nationwide team of specialist machine and plant equipped installers.

Our partnered machine installers, all of whom have reputable, long term experience in the installation market, clearly believe in the future of machine lay and demonstrate this in their commitment to investment in machinery, plant and their installation teams.

Training and Accreditation
Our unique Training Centre provides training and experience in the safe operation and maintenance of machine lay equipment and plant, together with best practice techniques for hand and machine lay block installation.

Installers learn how their contract teams can work together to achieve improvements in all of the installation processes from screed to compaction whilst considering quality and safety throughout.

Successful contractors receive the unique, industry recognised accreditation to safely operate the plant on site as well as Marshalls own Machine Lay certification.

Our installers work cohesively with Marshalls at all stages of the contract from value assessment through to effective project management.

Pavement Design Service
Increasingly we are working in an environment where effective whole life design and cost considerations are becoming critical factors to the main contractor in order to secure contracts. Marshalls has a dedicated and experienced Design Team who are available to cost effectively design all types of pavement construction. Whether it is a traditional or permeable, pedestrian or heavily trafficked application, Marshalls Design Team is able to provide indemnified solutions where required, incorporating sub base, wearing courses, drainage systems and sealants. Machine Lay can be considered at this stage and built in to assist the programme and budget requirements.

Contact our Design Team via: 
Tel: 08704 112233
Fax: 01422 312945
Email: advisory.services@marshalls.co.uk
**Project Management**

Marshalls Machine Lay Team works closely with our partnered installers throughout all stages of the contract.

With early involvement, Marshalls can assess a contract’s suitability for Machine Lay and will draw upon expert advice from our partnered installers.

By working with the contract team, the most cost-effective and efficient routes to installation can be identified for each individual contract, ensuring that the maximum benefit of Machine Lay is delivered to the supply chain.

At installation stage, our partnered installers will manage the package directly with Marshalls Machine Lay Team throughout the duration of the contract; relieving the main contractor of day-to-day supply issues.

**Speed**

Speed of installation will depend on the variables associated with each individual contract.

However, a recognised hand installation meterage, utilising a six man team over an eight hour day, incorporating screed, installation, compaction and sanding can be around 250m².

An experienced machine lay installer, automating all of the processes, can install up to 3 to 4 times more in the same period.

![Automation allows for speed and accuracy](image)

### Machine vs Hand Lay Productivity (3000m²)

- **Hand Lay**: 25 days
- **Machine Lay**: 5 days

**Installation Method**

Marshalls is continually working with machine manufacturers and installers to develop the most cost- and time-effective product configurations to aid the installation process.

**Quality and Consistency of Installation**

Our Machine Lay manufacturing facilities use unique, state-of-the-art technologies. This ensures that our range of Machine Lay products are made to exact standards, with added quality checks so products arrive on site and ready for immediate installation.

The range of machine equipment used, commitment of the installation teams and unique configurations of product within the Marshalls pack all aid to deliver a faster installation and consistent quality of the finished surface.
The Machine Lay Installation Process

1. Screeding
- Plant attachments or adapted plant, screeds the laying course sand or aggregate to the required depth and levels.
  ✔ Reduces manual screeding effort
  ✔ Reduces labour requirement
  ✔ Assists in speeding up the overall installation programme

2. Installation of Marshalls ML Products
- Marshalls Machine Lay (ML) products are supplied to site ready packed in the required laying formation.
- Layers of product are grabbed by the installation machine and placed on the screed.
  ✔ Reduces manual installation
  ✔ Reduces labour requirement
  ✔ Assists in speeding up the overall installation programme
The Machine Lay Installation Process

3. Compaction

- Single or multi-plate compactors are used to bed the product in to the laying course.

✔ Reduces vibration transfer to the installer
✔ Reduces labour requirement
✔ Assists in speeding up the overall installation programme

4. Sanding and Jointing

- Dry jointing sand is applied over the installed surface using one tonne sand bags.
- Dry jointing sand is then brushed into the joints using site plant with brush attachments.

✔ Reduces manual installation
✔ Reduces manual sweeping
✔ Assists in speeding up the overall installation programme
Blocks are pre-packaged in a herringbone formation and laid layer by layer. Each layer consists of 64 blocks (1.28m²) and can be laid in 45° herringbone or by turning the laying head, as 90° herringbone.

- Pre-packaged in a unique 45° herringbone formation.
- Installed layer by layer.
- 1.28m² layer size.

**Sizes**
- 200 x 100 x 60mm
- 200 x 100 x 80mm

**Colours**

- **Brindle**
- **Burnt Ochre**
- **Bracken**
- **Natural**
- **Charcoal**
- **Buff**
- **Marigold**
- **Red**

**Applications:**
- 60mm – Pedestrian, footpath and car park applications.
- 80mm – Heavy trafficked applications.

Marshalls Keyblok ML 45 has been specifically developed for areas of large installation or where heavy trafficking demands particularly good interlock.

The unique 45° formation offers the largest available cluster size (1.28m²) increasing productivity of block installation. This dramatically reduces the manual handling of materials when compared to hand lay or alternative machine lay formations.

The increased cluster and pack size can also significantly reduce on-site handling and vehicle movements when installed on large areas.

*Natural products are manufactured from aggregates sourced locally to the works and contain no pigmentation, therefore colour variation between products from different works is possible.
Keyblok ML 90
Machine Laid Rectangular Block Paving

- Pre-packaged in a unique 90° herringbone formation.
- Installed layer by layer.
- 0.88m² layer size.

**Sizes**
- 200 x 100 x 60mm
- 200 x 100 x 80mm

**Colours**

- Brindle
- Burnt Ochre
- Bracken
- Natural*

- Charcoal
- Buff
- Marigold
- Red

**Applications:**

- 60mm – Pedestrian, footpath and car park applications.
- 80mm – Heavy trafficked applications.

With a choice of available thicknesses Keyblok ML 90 is ideal for smaller areas or where lighter trafficking may occur. Its unique 90° formation allows an installation of 0.88m² at a time.

The cluster has also been specifically designed to form a standard 2.4m x 4.8m UK parking bay in twelve easy drops.

*Natural products are manufactured from aggregates sourced locally to the works and contain no pigmentation, therefore colour variation between products from different works is possible.
Keybloc Half Blocks

Marshalls Keybloc ML Half Blocks are specifically designed to assist the Machine Lay process.

The 100mm x 100mm Half Block format speeds the installation process by reducing on-site manual handling, reducing site cutting and minimising waste.

**Size** 100 x 100 x 80mm

**Colours**

- Brindle
- Burm Ochre
- Bracken
- Natural*
- Charcoal
- Buff
- Marigold
- Red

*Natural products are manufactured from aggregates sourced locally to the works and contain no pigmentation, therefore colour variation between products from different works is possible.*
The Eskoo Six ML block shape consists of three hexagons joined together – a configuration which produces a unit with twelve vertical faces each of which forms an interlocking plane with its neighbour. This gives extremely good load transfer characteristics, particularly beneficial in heavy duty industrial movements.

- Pre-packaged in a unique cluster.
- Installed layer by layer.
- 0.84m² layer size.

**Applications:** Trafficked and heavy duty applications.

Eskoo Six ML has been specifically developed for areas of large installation or where heavy trafficking demands particularly good interlock.

**Colours**

- Natural
- Charcoal
- Red

*Natural products are manufactured from aggregates sourced locally to the works and contain no pigmentation, therefore colour variation between products from different works is possible.*
Priora ML 45 – Permeable Paving
Machine Laid Concrete Block Paving System for Permeable Pavements/Sustainable Urban Drainage

Brindle Priora, Fountain Gait, Kilbride*

- Pre-packaged in a unique 45° herringbone formation.
- Installed layer by layer.
- 1.28m² layer size.
- Full Priora colour range.
- Complementary Product; Priora ML Half Block. See Keyblok ML Half Block for reference.

Size 200 x 100 x 80mm

Colours

- Brindle
- Burnt Ochre
- Bracken
- Charcoal
- Natural**
- Red
- Marigold
- Buff

Applications: Trafficked and heavy duty applications.

Marshalls Priora ML 45 has been specifically developed for areas requiring a large permeable pavement solution. Its benefits comprise quick installation and excellent interlock properties for trafficked areas. The unique 45° formation offers the largest available cluster size (1.28m²) increasing the productivity of block installation and dramatically reducing the manual handling of materials when compared to hand lay or alternative Machine Lay formations.

The increased cluster and pack size can also significantly reduce on-site handling and vehicle movements when installed on large areas.

Also visit our SUDs website: www.marshalls.co.uk/priora

*This picture indicates an ideal site for utilising Marshalls Machine Lay solutions
**Natural products are manufactured from aggregates sourced locally to the works and contain no pigmentation, therefore colour variation between products from different works is possible.
**Priora ML 90 – Permeable Paving**

*Machine Laid Concrete Block Paving for Permeable Pavements/Sustainable Urban Drainage*

- Pre-packaged in a unique 90° herringbone formation.
- Installed layer by layer.
- 0.88m² layer size.
- Full Priora colour range.
- Complementary Product; Priora ML Half Block. See Keyblok ML Half Block for reference.

**Size** 200 x 100 x 80mm

**Colours**

- Brindle
- Burnt Ochre
- Bracken
- Charcoal
- Natural**
- Red
- Marigold
- Buff

**Applications:** Trafficked and heavy duty applications.

Priora ML 90 is ideal for smaller areas or where lighter trafficking may occur. Its unique 90° formation allows an installation of 0.88m² at a time.

The cluster has also been specifically designed to form a standard 2.4m x 4.8m UK parking bay in twelve easy drops.

Also visit our SUDs website: www.marshalls.co.uk/priora

*This picture indicates an ideal site for utilising Marshalls Machine Lay solutions

**Natural products are manufactured from aggregates sourced locally to the works and contain no pigmentation, therefore colour variation between products from different works is possible.*
**Tegula ML**

**Concrete Sett Paving**

Traditional Tegula, Oaklands, Rugby*

- Uniquely packaged in a random cours ed laying pattern.
- 3 sizes per layer – one pack.
- Installed layer by layer.
- 0.93m² layer size.

**Sizes**

Available in 60mm and 80mm

- 240 x 160 x 60/80mm
- 160 x 160 x 60/80mm
- 120 x 160 x 60/80mm
  
  (Random Course)

**Colours**

- Traditional
- Burnt Ochre
- Pennant Grey
- Red/Charcoal Multi
- Harvest

**Applications:** Pedestrian, car park and trafficked applications.

Tegula ML is a traditional looking concrete sett paving solution, offering a beautiful finish reminiscent of the Sandstone and Granite Setts found in many parts of the country.

Tegula ML is the paving of choice for conservation areas, the surface texture, colours and pattern have a natural place in the more traditional British streetscape. The range of sizes enables an immediate impact to be made. Tegula ML has all the benefits associated with concrete block paving, in addition the surface has the extra quality of being aged, complementing the built environment around it.

Where a high quality surface, with design versatility is required for a traditional landscape, Tegula ML is clearly the preferred sett paving solution.
Grassguard ML
Machine Laid Porous Surfacing Concrete Grass Pavers

Uniquely packaged in a machine installable cluster.
- Installed layer by layer.
- Reduces the need for hand installation.
- 0.96m² layer size.

Sizes
- Grassguard 160 600 x 400 x 120mm
- Grassguard 180 600 x 400 x 120mm

Colour
- Earth Brown

Applications:
Grassguard ML Concrete Pavers are designed to combat soil erosion caused by the damaging effects of wind and water, wheels and feet. Their high quality concrete composition and open grid pattern help stabilise the underlying material and provide favourable conditions for the rapid establishment of vegetation cover.

When established, Grassguard ML combines the natural appeal of grass with the strength of concrete. The high surface ratio of grassed area to concrete ensures good grass growth, free drainage and a firm surface. The higher ratio of concrete to void on the underside optimises load carrying capability. Grassguard ML is particularly suitable in Firepath, Coastal Protection, Airport and Road and Roadway Drainage applications.
Accessories

Joint Filling Sand
- Specially selected kiln dried joint filling sand is available and recommended for use with all types of concrete block paving.
- Packaging: 25kg, 40 No. per pack.
- Pack Weight: 1 tonne.
- Split packs available.

Joint Filling Sand One Tonne Bags
- Specially selected kiln dried joint filling sand in one tonne bags for Machine Lay Contracts.
- Palletised and weather protected.
- Pack Weight: 1 tonne.
- Non returnable bag and pallet.

Keybond
- Water miscible liquid to stabilise joint filling sand in concrete block paving.
- Inhibits the removal of jointing sand by industrial suction cleaners.
- Helps prevent the ingress of water during the pavement’s early life.
- Biodegradable and non-toxic.
- When diluted, 5 litre container sufficient for 250-300m² paving area.
- Not suitable for flag paving.
- Split packs available.

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Items with reference numbers indicated in bold black are available ex-stock.
Sustainability

Sustainability is not just about the environment. At Marshalls we believe that Sustainability must be at the heart of our business and it must balance the social, the environmental and the economic. We call this our triple bottom line:

- Social progress which recognises the needs of everyone
- Effective protection of the environment
- Maintenance of stable levels of economic growth

Achieving our goal of Sustainability involves judging the long term merits of our business decisions against this triple bottom line.

We are the only company in the hard landscaping industry to belong to the Ethical Trading Initiative (ETI), a diverse alliance of retailers, brands, trade unions and NGOs working collectively to tackle the complex questions posed by ethical trade. We are also working closely and in conjunction with the communities in which we operate to deliver constructive projects in a number of areas such as schools, sports associations and government backed incentives.

From an environmental perspective we are committed to reducing the amount of carbon produced as a result of our operations. This involves researching, developing and implementing new environmentally friendlier innovative mix designs used in the manufacture of our leading product range; plus concerted action in sourcing our materials, reviewing our manufacturing, logistical and administration processes.

Environmental impact also includes issues such as waste reduction, recycling and re-use. In this matter we continue to achieve significant measurable reductions year on year in areas such as water management and packaging. As a mark of our work in the area of biodiversity, our Maltby site is the first active manufacturing site in the UK to be accredited the Wildlife Trusts’ Biodiversity Benchmark for Land Management.

The third element of sustainability, the economic is built upon the way Marshalls specialists do business. At the end of 2006 over 80% of Marshalls’ production tonnage was covered by an Integrated Management System to PAS 99 covering ISO 9000 for Quality Management, ISO 14001 for Environmental Management and ISO 18001 for Safety Management.

Finally we believe we cannot maximize long term profits by exploiting workers, destroying the environment and abusing our economic power – it is simply not sustainable. Operating our business in a sustainable manner means that we must not only make a profit but also take a proactive stance on our corporate social responsibilities measured against our triple bottom line.
### Marshalls Machine Lay Product Codes

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**Contact our Sales Office for further information**

Products with reference numbers indicated in bold black are available ex-stock. Products with reference numbers indicated in light black are manufactured to order. Contact our Sales Office to discuss your requirements.
Case Study – Port of Felixstowe

Challenge
The Port of Felixstowe, a member of the Hutchison Port Holdings Group, is the largest container port in the UK and one of the largest ports in Europe. Costain Limited was awarded a civil engineering contract worth £28m to construct a major extension to the port’s Trinity Terminal. The works included 230,000 m² of block paving for an additional container storage yard.

The challenge was to find a solution that would offer assurances of laying consistency and, on completion, would provide the port with a durable surface able to cope with the continual movements of heavy container-handling equipment and stacked container loads.

Marshalls secured the hard landscaping contract to supply the 230,000 m² of its Natural Keyblok concrete block paving in 200 x 100 x 80mm units.

Solution
More than half the paved area was installed using innovative Machine Lay techniques, developed by Marshalls during extensive trials in partnership with specialist paving contractor Tolly Paving – the initial phases were laid by hand. For the areas that were laid with the aid of machines, the contractors used bespoke machine heads supplied by leading equipment manufacturer Probst.

During the most efficient phases of the Machine Lay process, three laying machines were employed side-by-side at the laying face, allowing each machine to install more than five times the amount of Keyblok that would have been possible by hand. The blocks were packaged in a 45-degree herringbone formation, with each machine head picking up and laying 64 blocks (1.28 m²) at a time. When a suitable area had been laid and sand applied, a sit-on whacker was then used to ensure the blocks formed an even surface.

Benefits
Steve Attfield, Marshalls Commercial Manager said: “Marshalls expertise, experience and knowledge, as well as the guarantees we offer, from product quality and supply to design and installation, were key to the project. Additionally, our partnership approach in applying innovative Machine Lay techniques to install Keyblok over such a large area was a crucial factor in securing and fulfilling this major contract.”

The Port of Felixstowe now has an additional 23 hectare container storage area that benefits from a completely block paved surface, able to withstand the constant movement and load impacts of varied goods that are stored at a major cargo port.

The speed and efficiency of the machine laying techniques developed by Marshalls and employed at the Port of Felixstowe enabled vast areas of block paving to be laid by a minimal number of skilled operatives, in a safe and controlled manner.
Case Study – Factory Extension, Chipping Norton

Challenge
Planning requirements for the development of a factory extension at Primsdown stipulated a permeable paving solution to be installed in its surrounding car park and access areas. The permeable solution was placed to alleviate peak flows and total volumes of water entering in to the main sewerage system in the vicinity of the development.

A key feature of the scheme was the requirement for the installation to have a fully trafficable route all around the site during construction. This capability was essential to maximise site delivery efficiencies so neutralising unnecessary material movement and so not to limit delivery entry, movement & exit points as the business would still be fully operational throughout the construction period.

A further feature of the design was that it was essential that a fully proven interlocking permeable paving system was installed to maximise the integrity of the surface course.

Solution
Considering the whole package, Marshalls immediately identified that its machine installable permeable paving, Priora ML 4, would meet all of the construction requirements to deliver the project successfully within the pre-determined installation period.

Marshalls Priora ML is a permeable concrete block paving system that has a unique interlocking nib joint that provides proven stability to the paved area through friction without the need of joint filling sand. This joint also allows the ingress of water at source to naturally disperse into the sub base and then the ground below. This feature avoids ponding and naturally replenishes the area’s vital water levels while totally negating the use of the main water sewerage systems.

It is also considered environmentally friendly as the hydrocarbons carried in the water break down naturally in the sub base and heavy metals remain contained in a small vicinity so helping to release cleaner water into the ground below.

Machine Lay automates all of the installation processes from screeding of the laying course material, installation of the paving blocks, through to joint filling and compaction.

In Machine Lay format the blocks are supplied in a unique pack formation to enable speed of installation. Several packs can be positioned enabling the installation machine to move quickly and fluidly up and down the laying face as the clusters of paving are placed.

This whole technique reduces manual handling and installer fatigue and speeds up the entire installation process.

Benefits
By working with and providing a detailed installation proposition to the principal contractor and site installer, before and during the project, the permeable surface was completed successfully in the restrictive installation period.

In its construction planning Marshalls incorporated a DBM layer as part of the installed sub base. This provided a temporary wearing course for the issue of site traffic during the construction processes. It also added additional strength to the base design.

The machine application of the permeable laying course and block meant that the project was delivered on time despite the most inclement winter weather of snow and freezing ground conditions.
Case Study – Waterside Marina, Brightlingsea

Challenge
Forming part of the Brightlingsea yachting harbour this exclusive new development overlooks Brightlingsea Creek and the River Colne estuary and combines classic three-storey houses and one & two bedroom apartments. Wanting to evoke a traditional quayside aesthetic around the scheme, the hard landscaping specification for the project was a key consideration to its success.

Due to the thinking behind the design, functionality and performance were a critical factor in product specification. The hard landscaping material installed would require ‘the look’ but more importantly would have to perform and last withstanding the range of vehicular traffic accessing the site along with pedestrian movement considerations.

Material specification was also made even more testing as the final product was to be placed on an existing concrete podium that left minimal working depths for sub base construction and drainage solutions. This was compounded with new project schedules which meant the hard landscaping installation deadline had been reduced.

Solution
Working closely with our Partnered Installer, Marshalls provided a range of expert pre-contract and installation advice and services, with additional support throughout the installation process.

As part of this service Marshalls produced a consultative pavement design that considered the full trafficking requirements of the site with experienced consideration taken to the limited construction depths of the sub-base. This was matched to the aesthetic considerations required by the architect and the time in which it was required to be installed.

For the installation Marshalls proposed using its Tegula Machine Lay (ML) concrete block paving. Offering a beautiful finish reminiscent of Sandstone and Granite Setts it was the ideal aesthetic to complement the development and its surroundings whilst also being able to cope with trafficking demands required of the surface.

Tegula ML is supplied in a unique pack configuration providing a random laying pattern giving that further authentic feel. The new pack format reduces the need for vehicular movements on site and significantly reduces manual handling making it more time-efficient to lay.

In conjunction with the pavement design, Marshalls free, no obligation, Water Management Design Service produced a detailed solution and support documentation for its Birco linear drainage system. This comprised thorough CAD drawings, hydraulic capacity measurements and correct specification of components required - saving time, money and cost for the contractor.

Benefits
Being involved in the critical decision making stages during the design process enabled Marshalls to deliver the ideal solution for the scheme. The proposals submitted by Marshalls were well informed and met the requirements of the brief meaning the project was completed in the required time schedule. In addition, by using the Marshalls Design services accurate quantities were ordered reducing waste product on site. Delivery schedules were also planned and executed in line with an estimated installation programme designed by Marshalls and the installation team maximising storage and access to the site.