



PAVING SINGAPORE RANGE

ROADSTONE LTD.



The origins of Roadstone go back to the early 1930's, when two young Dublin brothers Tom and Donal Roche started a sand and gravel haulage business with a Bedford truck. They operated from a small yard at Inchicore in the suburbs of West Dublin.

Initially called Roche Brothers it later became the Castle Sand Company and developed steadily during the 30's and 40's.

The brothers launched a new company, Roadstone, on the Irish Stock Exchange in 1949.

In parallel to this story, the Irish cement industry, previously a state body was also developing rapidly. By the end of the 60's, Irish Cement had become the largest industrial Company quoted on the Irish Stock Exchange with Roadstone the third largest. In 1970 the two Companies merged to become Cement-Roadstone Holdings now known as CRH plc.

CRH

CRH (LSE: CRH, ISE: CRG, NYSE: CRH) is a leading global diversified building materials group, employing c.85,000 people at c.3,600 operating locations in 32 countries worldwide.

With a market capitalisation of c.€26 billion (June 2018), CRH is the largest building materials company in North America and the second largest worldwide. The Group has leadership positions in Europe as well as established strategic positions in the emerging economic regions of Asia and South America.

CRH is committed to improving the built environment through the delivery of superior materials and products for the construction and maintenance of infrastructure, housing and commercial projects.

A Fortune 500 company, CRH is a constituent member of the FTSE 100 index, the EURO STOXX 50 index, the ISEQ 20 and the Dow Jones Sustainability Index (DJSI) Europe. CRH's American Depositary Shares are listed on the NYSE.

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MILAN

*Linear paving to suit residential
and commercial projects*



Pedestrian



*Light
Vehicle*



Natural



White Granite



Midnight

Product Technical data

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|-----------------------------|-------|-----------------------------------|------------------------|--------------------|
| 360x120mm & 480x120mm | 60mm | 9.9 units of each size | 192 | 9.67m ² |

Mixed bales include an equal number of all sizes.



Milan Natural, White Granite and Midnight



Milan Natural, White Granite and Midnight

CASTLESTONE

Antiqued rustic appearance



Pedestrian



*Light
Vehicle*



*Heavy Goods
Vehicle*

Curragh Blend



Castlestone Natural



Castlestone Natural & Charcoal



Curragh Blend

CASTLESTONE

Antiqued rustic appearance



Pedestrian



*Light
Vehicle*



*Heavy Goods
Vehicle*

Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------------------------|-------|-----------------------------------|------------------------|---------------------|
| 240 x 160mm | 60mm | 26 | 360 | 13.82m ² |
| 160 x 160mm | 60mm | 39 | 504 | 12.90m ² |
| 120 x 160mm | 60mm | 52 | 672 | 12.90m ² |
| 240 x 160mm | 80mm | 26 | 300 | 11.52m ² |
| 160 x 160mm | 80mm | 39 | 360 | 9.23m ² |
| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
| 160 x 160mm & 240 x 160mm | 60mm | 15.6 units of each size | 432 | 13.82m ² |

Mixed bales include an equal number of all sizes.



Natural

Charcoal Grey

Tan

Curragh Blend

Causeway Blend

Heather

THOMOND®

Chamfered edge defined with sharp clean lines



Pedestrian



Light Vehicle

Thomond Harvest Blend



Natural



Charcoal Grey



Harvest Blend



Vermont



Thomond Vermont & Charcoal

Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------------------------|-------|-----------------------------------|------------------------|---------------------|
| 240 x 160mm & 160 x 160mm | 60mm | 15.6 units of each size | 432 | 13.82m ² |

Mixed bales include an equal number of all sizes.



*Thomond Natural with
Castlestone Setts*

URBANA™

Paved surface modelled on natural stone



Pedestrian



*Light
Vehicle*



Urbana Sandstone

Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---|-------|-----------------------------------|------------------------|---------------------|
| 300 x 200mm & 200 x 200mm & 200 x 100mm | 60mm | 8.33 | 324 | 12.96m ² |

Mixed bales include an equal number of all sizes.



Urbana Limestone



Urbana Sandstone



Limestone



Sandstone

URBANA™ SETTS

"T" shaped pieces provide a alternative to laying a sett detail



Pedestrian



Light Vehicle

Urbana Charcoal Grey



Natural



Charcoal Grey



Typical Format

Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|----------------------|-------|-----------------------------------|------------------------|-------------------|
| 400/200 x 200mm | 60mm | 16.67 | 160 | 9.6m ² |



Urbana Setts Charcoal and Natural

VERONA®

Exposed aggregate granite appearance



Pedestrian



*Light
Vehicle*



Verona Paving White Granite



Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------------------------|-------|-----------------------------------|------------------------|---------------------|
| 240 x 160mm & 160 x 160mm | 60mm | 15.6 units of each size | 432 | 13.82m ² |

Mixed bales include an equal number of all sizes.



COBBLESETT®

Rectangular pavior with
chamfered top edge



Pedestrian

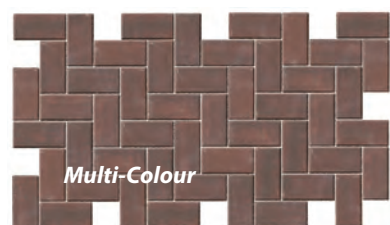
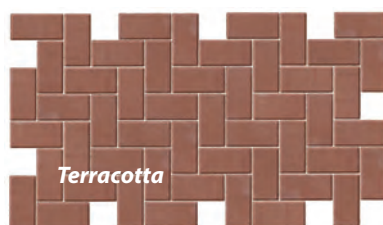


Light
Vehicle



Heavy Goods
Vehicle

Cobblesett Tan



Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|-------------|-------|-----------------------------------|------------------------|---------------------|
| 200 x 100mm | 60mm | 50 | 600 | 12.00m ² |
| 200 x 100mm | 80mm | 50 | 500 | 10.00m ² |

CASTLESTONE® SETTS

Square setts to enhance all 60mm paving ranges as borders and features.



Pedestrian



*Light
Vehicle*

Castlestone Setts Charcoal Grey border



Charcoal Grey



Natural

Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|-------------|-------|-----------------------------------|------------------------|---------------------|
| 100 x 100mm | 60mm | 100 | 1000 | 10.00m ² |

AQUA CASTLESTONE

Antiqued rustic appearance



Pedestrian



*Light
Vehicle*

Aqua Castlestone Curragh Blend

Aqua Castlestone 60mm



Natural



Charcoal Grey



Causeway Blend



Curragh Blend

Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------------------------|-------|-----------------------------------|------------------------|---------------------|
| 240 x 160mm & 160 x 160mm | 60mm | 15.6 units of each size | 432 | 13.82m ² |

Mixed bales include an equal number of all sizes.



Aqua Thomond Natural

Aqua Thomond 60mm



Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------------------------|-------|-----------------------------------|------------------------|---------------------|
| 240 x 160mm & 160 x 160mm | 60mm | 15.6 units of each size | 432 | 13.82m ² |

Mixed bales include an equal number of all sizes.

Aqua Thomond Single Sized 80mm



Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|-----------|-------|-----------------------------------|------------------------|---------------------|
| 240x160mm | 80mm | 26 | 300 | 11.52m ² |

AQUA VERONA

Exposed aggregate granite appearance



Pedestrian



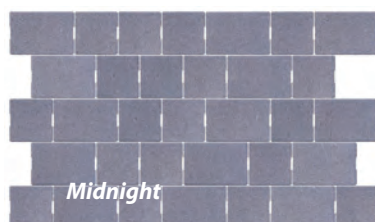
Light Vehicle



Heavy Goods Vehicle

Aqua Verona White Granite & Natural

Aqua Verona 60mm



Product Sizes & Quantities

| Size (mixed bale) | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------------------------|-------|-----------------------------------|------------------------|---------------------|
| 240 x 160mm & 160 x 160mm | 60mm | 15.6 units of each size | 432 | 13.82m ² |

Mixed bales include an equal number of all sizes.

Aqua Verona Single Sized 80mm - Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|-----------|-------|-----------------------------------|------------------------|---------------------|
| 240x160mm | 80mm | 26 | 300 | 11.52m ² |



Aqua Riven Sandstone

Aqua Riven Single Sized 80mm



Limestone



Sandstone

Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|-----------|-------|-----------------------------------|------------------------|---------------------|
| 240x160mm | 80mm | 26 | 300 | 11.52m ² |

AQUAFLOW ML

Aquaflow ML can be laid by hand or by machine. Designed for heavy-duty applications



Pedestrian



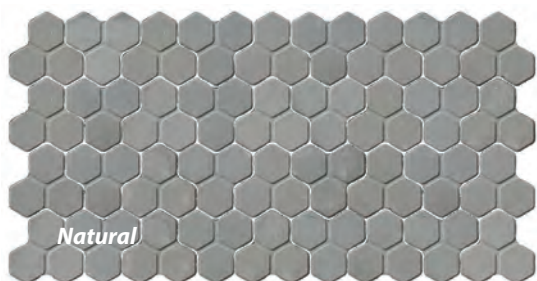
Light Vehicle



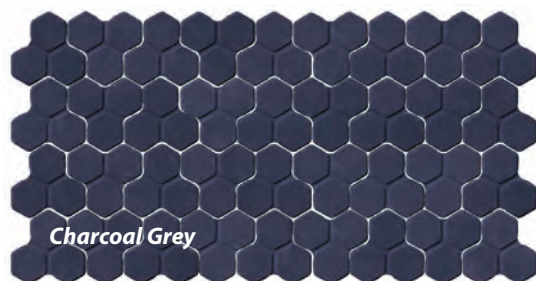
Heavy Goods Vehicle



Aquaflow ML Natural and Charcoal Grey



Natural



Charcoal Grey



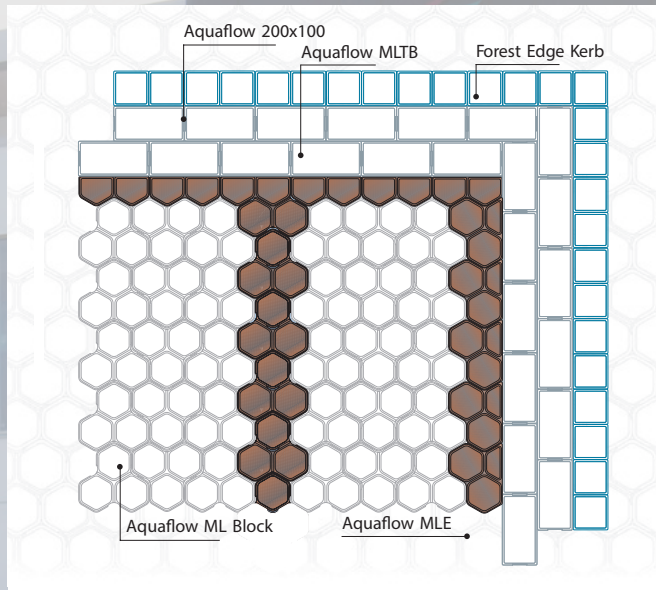
Aquaflow ML



Aquaflow MLTB



Aquaflow MLE



Aquaflow ML block®

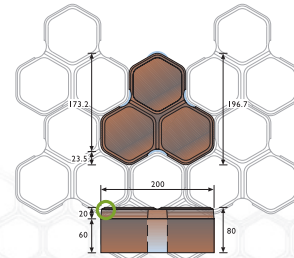
For Roads and heavy duty use

Size
80mm

Laying pattern

Include stretcher course around edge in conjunction with MLE and

MLTB

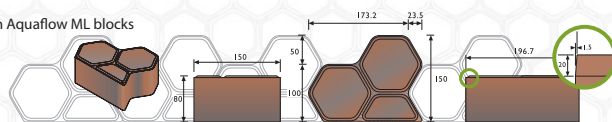


Aquaflow MLE®

Endblock

For use with Aquaflow ML blocks

Size
80mm

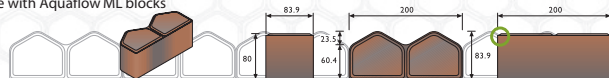


Aquaflow MLTB®

Top and bottom block

For use with Aquaflow ML blocks

Size
80mm





AQUA COBBLESETT®

Rectangular pavior with chamfered top edge



Pedestrian



Light Vehicle



Heavy Goods Vehicle

Product Sizes & Quantities

| Size | Depth | Quantity (per m ²) | Quantity (per bale) | Bale size |
|---------------|-------|--------------------------------|---------------------|---------------------|
| 200mm x 100mm | 80mm | 50 | 500 | 10.00m ² |

Aqua Cobblesett Natural

Aqua Cobblesett 80mm



Natural



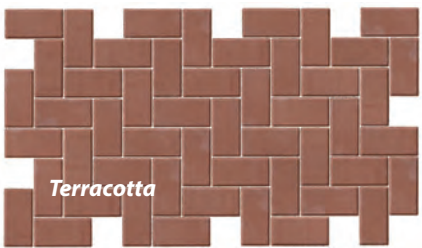
Charcoal Grey



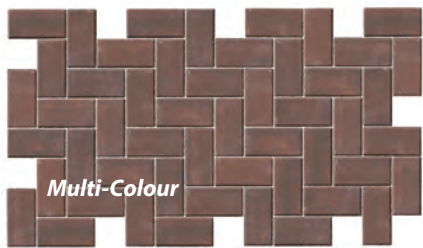
Tan



Heather



Terracotta



Multi-Colour

SPLAYED KERB BLOCK

Three-way kerb block provides options for Bull Nose, Low Splay, or a High Splay Kerb

Splayed Kerb Block



Natural



Charcoal Grey



Terracotta



Tan



Heather

Mini Splayed Kerb Block



Natural



Charcoal Grey



Terracotta



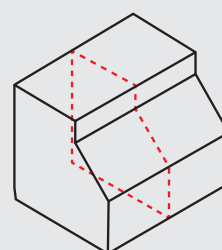
Tan



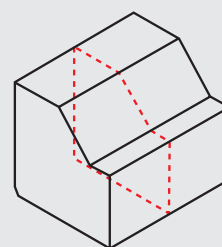
Heather

| Size | No. per L/Meter |
|--------------------------------|-----------------|
| 200 x 160 x 160mm | 5 |
| 100 x 160 x 160mm Mini Kerb | 10 |

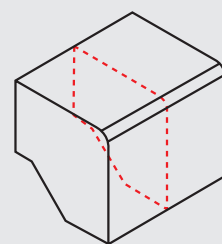
All Kerb Blocks should be laid in accordance with BS 7533.



High Splay
Ideally used where more restraint and a higher definition is required.



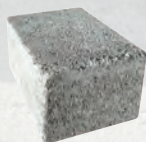
Low Splay
Ideally used where access is required.



Bull Nose
Perfect for steps and for a softer edge appearance.

CASTLESTONE® KERB

Multi-purpose kerb



Natural



Charcoal Grey

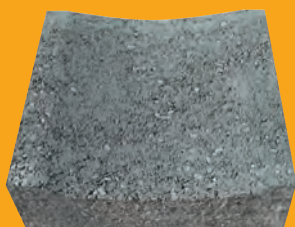
All Kerb Blocks should be laid in accordance with BS 7533.

| Size L x W x H | No Per L/Metre |
|-------------------|----------------|
| 240 x 120 x 160mm | 4.16 |
| 240 x 160 x 120mm | 4.16 |
| 160 x 120 x 240mm | 6.25 |
| 120 x 160 x 240mm | 8.33 |

CHANNEL BLOCK



Natural



Charcoal Grey



Terracotta



Tan

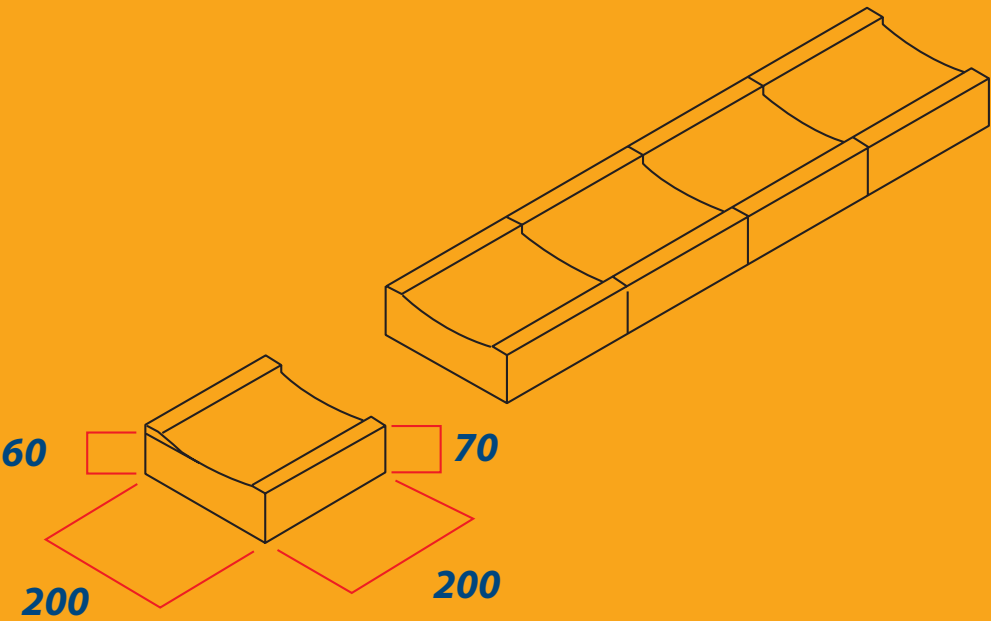
When designing the falls across paving, it is necessary to look at the path that the surface water will follow.

Roadstone's Channel block is the solution. With the coordinating face size of 200 x 200mm and a depth of 70mm, it is ideal to meet your needs.

The 10mm deep dish in the face of the channel block is sufficient to carry the water to the drainage point without creating a trip hazard.

As the Channel block is available in standard colours, there is a colour to blend or contrast with your design requirements.

| Size | No Per Linear Metre | Unit Weight |
|------------------|---------------------|-------------|
| 200 x 200 x 70mm | 5 | 6.5 kg |



GENERAL INFORMATION - MAINTENANCE

Cleaning & sealing of concrete paving units

All surfaces require some element of cleaning and maintenance, and paving is no different. Regular maintenance and cleaning will maintain the surface appearance and overall performance of both concrete paving and concrete paving flags.

Initial maintenance

During the very early life of the paving, the joints between the units should be regularly "topped up" with jointing sand. The paving should only be brushed by hand. Mechanical sweepers and sweepers with high suction forces should not be used, since there is a risk of loss of jointing sand from between the units which will cause the loss of interlock and failure of the paved surface.

Cleaning of pavements

There are four levels of cleaning that can be carried out on a paved area.

Prior to undertaking any maintenance/cleaning, it is advisable to carry out a trial in a small inconspicuous area to ensure there are no adverse effects on the paving.

1. General dirt should be removed by regular dry brushing.
2. Where the paving has become dull showing a loss of colour, a wet wash with a stiff bristle brush and garden hose can be adequate.
3. For more stubborn areas, a power washer can be used, taking care not to remove the jointing materials

(sand or mortar). The washer should be on a medium pressure setting or lower, and should NOT be aimed directly at the paving surface, but at an angle of 30° approximately.

4. Cleaning detergents can be used, however, some detergents are acidic and overuse can damage some paving products. It is advisable to follow the manufacturer's instructions and rinse the areas fully. The resulting runoff should be carefully channelled to either drainage points or containers from where it can be safely disposed of.

Replace any washed out jointing sand with new dried sand (available in 25 kg bags from Roadstone) once the paving has dried.

Weeds

Avoid the re-occurrence of weeds by removing them once they appear. If a weed killer is required, test in a small area prior to use. Always follow the manufacturer's instructions.

Mosses & Lichens

Mosses and lichens will grow on most surfaces, particularly in shaded and north facing areas. There are several treatments that will deal with these growths on the market. The use of sulphate of iron is not recommended as it will stain the paving.

Efflorescence

This is a naturally occurring phenomenon, which occurs to a varying extent on all cement/ lime based products, for which Roadstone cannot be held responsible. Efflorescence is not a manufacturing fault and in no way affects the structural integrity of concrete products.

Efflorescence, also known as lime bloom, can appear as a white deposit covering part or the entire surface. Except in very severe cases, the phenomenon disappears completely when the blocks are wet and reappears as the blocks dry out. The phenomenon is temporary and will, with time, disappear as a result of normal traffic and weathering.

Efflorescence can be removed using an acidic washing agent. The area should first be thoroughly soaked with clean water and a commercial acidic washing material (available from Roadstone and most builders' merchants) should be immediately applied in accordance with the manufacturer's instructions.

To avoid colour variation of the washed surface, equal amounts of washing agent should be applied to all areas of the pavement.

As the efflorescence dissolves, there will be some frothing (effervescence) and once this has finished the whole surface should be rinsed thoroughly with clean water, taking care to dispose of the run-off safely. In some cases, more than one treatment may be required.

Oil stains

Oil penetrates readily into most concrete paving, therefore any spillages should be removed promptly with an absorbent material, e.g. paper towels, cloth or granules to prevent staining.

DO NOT wipe the oil - this drives it into the concrete and spreads the spill over a larger area.

A degreaser should be applied as soon as possible to break down the oil. Washing up liquid used neat is a good starting point while a suitable degreaser is being sourced. If the stain persists, then an emulsifying degreaser should be brushed onto the affected area, and left for a period of time, in accordance with the manufacturer's instructions. The emulsified oil should be washed away with plenty of water. (Degreasers are available from your local Roadstone outlet and hardware stores)

Sealing

The use of certain sealers can prevent most stains occurring on the surface and aids cleaning. Sealants may require further applications depending on the frequency of use on the paved surface. Where the surface has been treated with a specialist prepolymer urethane sealer and stabiliser, it should be cured in accordance with the manufacturer's recommendations before allowing trafficking.

Permeable Paving Maintenance (Roadstone Aquaflow)

The surface blocks have a design life equivalent to standard block paving. The surface blocks require routine maintenance and the surface should be brushed at least twice a year, either with a mechanical brush, **ensuring that the vacuum is switched off**, or by hand. It is recommended that this should be carried out in the spring and after leaf fall in autumn.

After the brushing, the 3mm grit should be re-applied to the surface where appropriate (available from Roadstone) and brushed back into the joints.

HEALTH & SAFETY

- Always wear the recommended protective clothing.
- Always work in a well ventilated area.
- When using detergents and cleaners please ensure that you follow the manufacturer's instructions fully.

NOTE:

Prior to undertaking any maintenance/cleaning, it is advisable to carry out a trial in a small inconspicuous area to ensure there are no adverse effects on the paving.

This advice is offered as a guide only; Roadstone does not accept any liability for any damages occurring from its use.

For further details please visit www.roadstone.ie

GENERAL INFORMATION

- LAYING PAVING

Roadstone, with its product ranges, has always kept both the customer and the paving contractor at the forefront of its product range, offering both durable and pleasing products along with the correct accessories required to complete any project undertaken.

When considering the physical work and skills required in laying paving, you should include the following:

1. Do you have the required skill and the time to completely finish the job?
2. Have you access to the required tools?
3. Are you fit enough to carry out the physical work required?

If the answer is no to any of the above questions, you should seek the help of an experienced contractor.

The following advice consists general recommendations only, and represent standard good building practise.

Further more detailed information can be obtained from www.roadstone.ie or consult guidance document BS 7533 Parts 1 to 9.

Site Preparation

- Remove all site vegetation and top soil to a suitable load bearing stratum, incorporating the correct level, including falls. Check and remove any soft spots and fill with appropriate material.

Sub Base Construction (typical residential application)

- Typically a sub-base of compacted Clause 804 or similar, between 150mm and 300mm deep will be sufficient for most applications, depending on soil type, depth of build-up required and loading that will be applied to the finished surface.

- For footpaths around dwellings, material conforming to Annex E of SR21:2004+A1:2007 "guidance on the use of I.S. EN 13242:2002 – Aggregates for Unbound and Hydraulically Bound Materials for use in Civil Engineering Work and Road Construction (incorporating amendment 1:2007 --- (4/40mm coarse aggregate, or suitable Clause 804 material).
- The sub-base should be compacted using a vibrator or roller to within 10/15mm of level required. (40mm + depth of paving unit below finished level).
- Falls should be built into the sub-base and the area should be free draining. A saturated sub-base and laying course is one of the main causes of failure and rutting.
- Before spreading the laying paving grit sand, the area should be inspected and no area of the finished level of the base course should be more than the depth of the block +40mm, especially around manholes, kerbing and other obstacles.



Edge restraints

- A selection of concrete kerbs and edge restraints including Edge Pro are available from Roadstone.
- Generally concrete kerbs are used, kerbs should be fixed into position by haunching the kerb unit with a suitable concrete mix.
- Ensure kerb line follows the fall of the finished surface.

Screeding of Bedding

- The laying course should be a washed course grit sand complying with the requirements of Tables D1 & D2 of annex D of BS 7533 Part 3. Available from Roadstone locations.
- This should be 40mm in thickness after final compaction.
- Pay particular attention to the setting of the bedding course, as the finished surface of the paving will mirror this layer. Ensure correct falls are maintained. Use screeding rails to ensure a correct surface level.
- This can be laid either partial pre-compaction or compacted after laying.
- Do not walk on surface after screeding / laying sand.

Laying of Paving

- Decide on required pattern and work from a corner.
- Always lay the paving against any falls (up hill).
- Work across the paved surface.
- Check lines and levels regularly.
- Cutting of paving should be carried out using a block splitter (guillotine) – please ensure that you follow the manufacturer's guidelines for use.
- **Always select products from at least three different bales to ensure a correct blending is achieved.**
- A concrete saw can also be used, but care should be taken not to allow dust from this saw onto the finish surface or the blocks prior to use. Cutting with a con saw should therefore be carried out away from the work area and the cut block cleaned before placing.
- After cutting in and laying all blocks, check surface and remove and replace any damaged or defective blocks.
- Sweep all debris material from the area and carry out a final check for damaged or defective blocks.
- Do not lay paving on saturated sand as the laying course will be unstable and liable to rutting until the sand dries out.

Plate Vibrating, Interlock and Joint Filling

- Use a suitable weight vibrator.
- Ensure the surface of the vibration plate is clean.
- Some vibrators can be fitted with a rubber mat that will reduce the possibility of scuffing the surface of the block.
- The Initial pass with a plate vibrator should compact the blocks approximately 20/25% into the sub-base, bringing the sub-base sand into the joints, creating the interlock.
- The area should be checked at this stage and any defective blocks should be replaced.
- Check levels again and reinstate if necessary.
- Spread the kiln dried jointing sand evenly over the surface ensuring all joints are full.
- Re-vibrate surface and top up all joints. Continue this process until all joints are full with sand.
- Top up with jointing sand again in 28 days and follow regular maintenance procedures afterwards. The finished area is now suitable for all traffic.

IMPORTANT

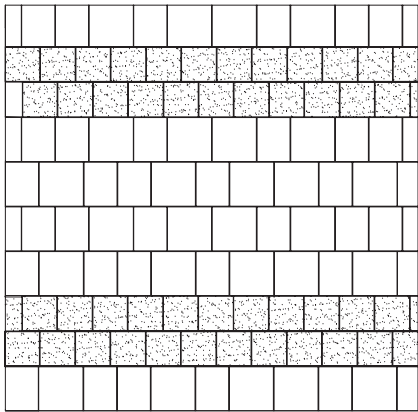
Every care has been taken to reproduce the colour and blocks in this document as accurately as possible. However, we can not reproduce exact colours in print and recommend you examine relevant samples prior to ordering.

Roadstone is not responsible for the naturally occurring phenomenon of efflorescence nor the normal variation in colour or texture inherent in concrete products.

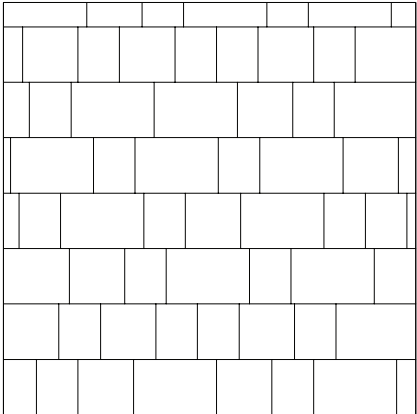
The information given in this brochure is correct to the best of our knowledge but customers and specifiers must satisfy themselves as to the suitability of any particular product, specification or design detail for a specific application.

SAMPLE PAVING LAYOUTS

CASTLESTONE AND SETTS

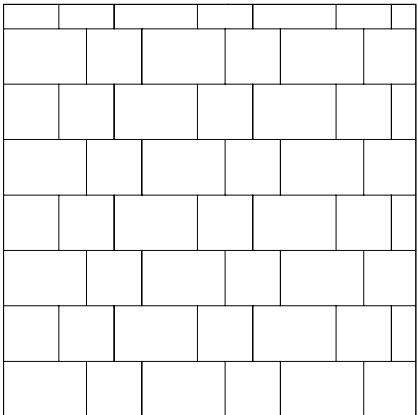


CASTLESTONE MIX OF 3 SIZES

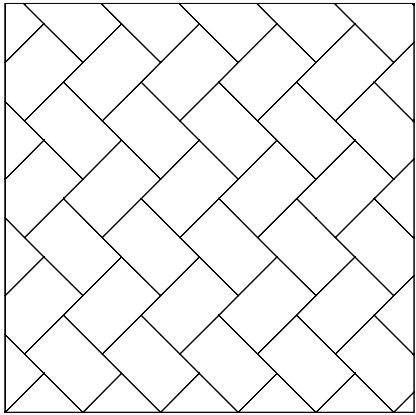


Indicative layouts shown represent a portion of a paved area but should not be used as a pattern to follow or continually repeat, as this may result in having a surplus of one particular size left over. Use all the paving sizes within each bale to cover the required paved area.

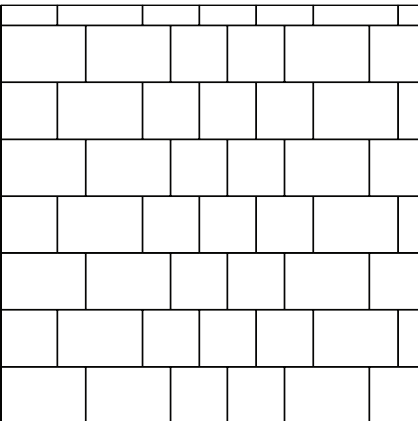
CASTLESTONE MIXED STRETCHER BOND



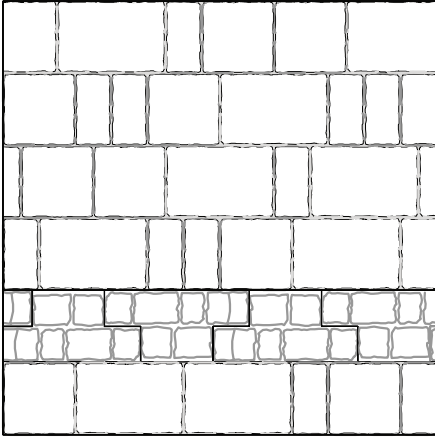
CASTLESTONE 45° HERRINGBONE



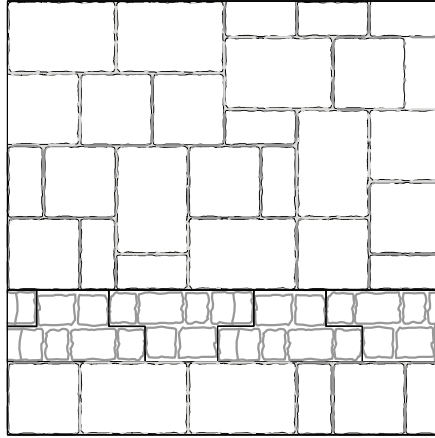
THOMOND RANDOM BOND



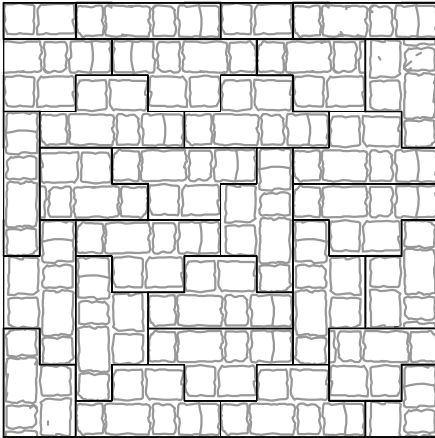
URBANA COURSED



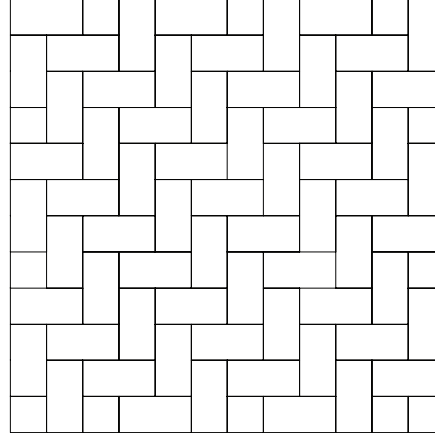
URBANA RANDOM



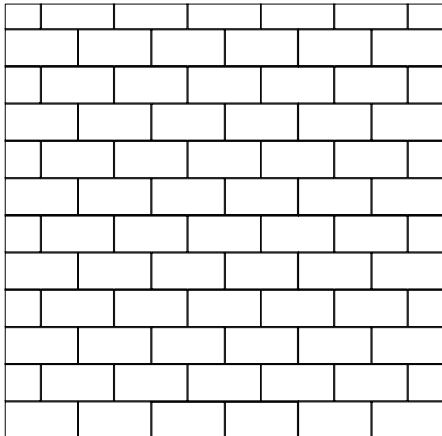
URBANA SETTS



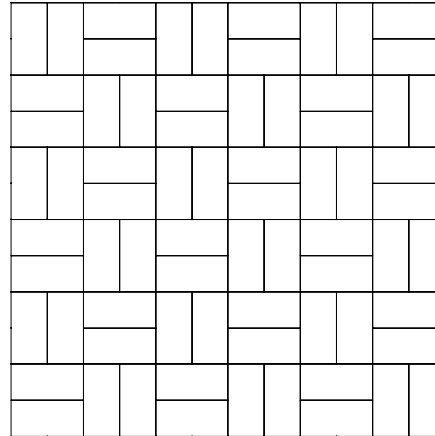
COBBLESETT 90° HERRINGBONE



COBBLESETT STRECHER BOND



COBBLESETT PAVING



Indicative layouts shown represent a portion of a paved area but should not be used as a pattern to follow or continually repeat, as this may result in having a surplus of one particular size left over. Use all the paving sizes within each bale to cover the required paved area.

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Browse all available colours, finishes, and patterns, before you view your design in a real world setting.

Please note that only products shown in this brochure are available in Singapore and Malaysia.



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