

# Surfacing guide for path projects



Clyde Walkway, Blantyre



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HEALTHIER SCOTLAND

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## Using this guide

We have created this guide to help you choose the most effective and appropriate surfacing material for your path project.

It provides details on a range of path surfacing options available within Scotland, many of which can be viewed at the [Paths for All National Path Demonstration Site](#) within SRUC Oatridge Campus, and is intended as a guide to aid decision making and specifying of path installations or upgrades to suit most shared use path requirements and budgets. It should not be regarded as an exhaustive listing.

Regional and/or supplier variations of material and colour will be available. These should be investigated, where appropriate, noting that locally sourced materials and suppliers will assist in keeping haulage impact and costs to a minimum. Any noted links to material suppliers, products and additional technical resources were correct at the time of issue.

Installation costs listed within this guide are intended to be indicative only and have mostly been taken from [Paths for All – Estimating Price Guide for Path Projects](#). Any estimated costings have typically assumed a new build, full tray excavation and construction, unless otherwise noted.

All prices are estimated at the time of issue and are based on the cost of a competent contractor supplying the materials and carrying out the work. **VAT is not included** in the prices and no allowance been made for contingency. It is generally recommended that a minimum contingency allowance of 5% is included within your estimations.

For further information on the design and construction of paths, including more detailed specifications and standard detailed drawings, please visit [Paths for All, Technical Advice & Support](#).

For additional help in using this guide, please get in touch at  
Tel: **01259 218888** Email: [technical@pathsforall.org.uk](mailto:technical@pathsforall.org.uk)

## Whin Dust/ Granite Dust

### General description

Unbound surfaces rely on friction between small aggregate particles (typically graded down from 6mm in size) to help them 'bind' together. They are susceptible to damage from moving water and a suitable crossfall or camber (recommended max 1:40) is essential to help shed water off the surface and into adjacent ground or other drainage feature. Similarly, any path with an unbound wearing course should not exceed linear gradients of 1:8 (equivalent to 12.5% or 7°). Anything steeper could result in the material being rapidly washed off the surface, exposing the base material to erosion.

### Suitability

Paths with a 'dust' wearing course are a familiar sight in many rural and semi-urban settings and can be an excellent choice of surfacing where a compromise between durability and value for money is required. When constructed to a high standard, and in the correct situation, an unbound whin or granite dust path will provide a smooth and firm surface that is suitable for all user groups. Care is needed to ensure that the correct depth of dust is applied during construction and/or any ongoing maintenance. Too thick and the path surface is likely to be soft when wet; too little and the larger angular base aggregate will be kicked up and lie loose on the surface making it potentially unsuitable for some path users, including horses and wheelchair users. In addition, there will be a need for higher levels of ongoing maintenance than other more expensive semi-bound / self-binding or bound materials however its ease of application makes it ideally suited to any ongoing maintenance by unskilled labour e.g. local path volunteers.

# Unbound surfaces

## Benefits

- When properly laid, it can form a smooth and semi-durable surface on level ground, or gentle to moderate path gradients less than 1:8, that can be used by all path users, including horses
- a lower cost surface to install than a semi-bound / self-binding material e.g. Ultitrec® and significantly less costly than a fully bound material e.g. bitmac or asphalt
- a natural looking, visually familiar and semi-formal surface that blends in well with most landscape settings
- doesn't require skilled operatives or specialist machinery. Suitable for volunteers to apply and maintain
- typical lifespan of 5-10 years

## Limitations

- surface can be liable to water scouring if water cannot get off the path or is shed too quickly off the path. Good path design with reduced gradients, recommended crossfalls or camber and adequate drainage is essential to enhance durability
- not durable on steeper gradients (max. 1:8 / 12.5% / 7°)
- can be susceptible to frost heave. When first laid, any insufficient compaction of the surface material may allow it to hold water that can freeze then thaw thereby loosening the surface, making it soft underfoot and more liable to be washed off by surface water erosion. Thorough compaction of the finished surface can significantly reduce likelihood of damage from frost heave
- this type of surfacing is more susceptible to general wear and tear
- regular inspection and maintenance is required; particularly if the level of use is high, the path is within a woodland setting (very susceptible to washout from water dripping off trees) or where there are steeper gradients along the path route
- granite dust is quarried at a limited number of places across Scotland meaning haulage costs can be prohibitive. It is typically only used where local quarries are not producing the more widely available limestone/whin dust

# Unbound surfaces

## Cost

£16.30 - £25/m<sup>2</sup>

## Technical resources

[Whin Dust Path – Paths for All Standard Detail Drawing & Specification Details](#)

[Whin Dust Path – Forestry Commission Scotland Standard Detail Drawing](#)

[Granite Dust Path – Paths for All Standard Detail Drawing & Specification Details](#)

[Aggregates for Path Construction: Sustrans Technical Information Note No. 7](#)

## Images



# Unbound surfaces

## 'As dug'

### General description

A locally 'won' surfacing material, ideally consisting of free draining, naturally occurring sands and rounded gravels with relatively high fines and clay content which helps to 'stick' the sand and gravel particles together when thoroughly compacted with a roller. It is commonly sourced from on-site 'borrow pits' or imported to the site from a nearby source. 'As dug' will often 'bind' well after compaction and can form a reasonably firm and smooth surface, however it can vary in composition along the path route and its quality and consistency should be carefully monitored when used.

### Suitability

'As dug' materials can create a semi-formal, single layer path base and surface with a natural appearance that has a good landscape fit whilst also meeting user needs. Care is needed to ensure that any locally available material is sufficiently granular in nature with excellent free-draining, 'binding' and compaction properties. In some instances; particularly in remote, upland or other environmentally sensitive locations where access for construction plant is limited/not desirable and/or aggregate quarries are few, the use of 'as dug' material may be the only economically viable source of construction/surfacing material. In such situations, the use of highly skilled machine operatives, with proven experience in this type of path construction technique, is strongly advised. It is possible to improve the quality and suitability of 'as dug' material through on-site grading using a portable non-vibrating screener, however, this will significantly increase installation costs.

# Unbound surfaces

## Benefits

- material is 'won' locally with little, or no, requirement to import aggregate onto the site
- material will typically be a good landscape fit in terms of surface colour and composition
- relatively low impact and cost of installation, when compared to imported aggregates e.g. Type 1
- material readily available on-site for future maintenance purposes
- can provide a very good surface, if suitable material can be found
- where available, 'as dug' material will typically be the only material used on the path i.e. will be used to form a combined base and surface layer. It is unlikely to be used solely as a surface/wearing course
- typical lifespan of 5-10 years

## Limitations

- not all locally 'won' material will be suitable for path surfacing and it may also be of variable quality along the length of any longer path, particularly when sourced from more than one borrow pit
- requires a contractor with considerable experience in this type of path construction and highly skilled machine operator(s)
- may require some additional on-site grading, to provide material suitable for path construction. This will add cost in grading and transporting of graded materials
- if material has high fines or clay content, it may become very slippery when wet
- requires more regular inspection and is less durable than semi-bound and bound surfaces

## Cost

£10 - £18/m<sup>2</sup>

# Unbound surfaces

## Technical resources

['As Dug' Path – Paths for All Standard Detail Drawing & Specification Details](#)

['As Dug' Path – Forestry Commission Scotland Standard Detail Drawing](#)

## Images



## Semi-bound surfaces

### General description of semi-bound (self-binding) materials

As the term suggests, these materials will bind together far better than unbound surfaces (e.g. whin or granite dust). When combined with the thicker application depths, they will form a more durable path surface which is better suited to heavily trafficked routes, steeper slopes, woodland locations and general all-weather use. Semi-bound surfaces are best spread and levelled using an asphalt mini paving machine or purpose built drag box, reducing any risk of material separation when spreading by hand i.e. the coarser and finer materials can be separated/raked out ('overworked'), with the larger material being lifted to the top. For best results, lay materials whilst damp and compact to refusal using a heavy vibrating roller (e.g. 120 type roller). Other, more decorative, semi-bound surfacing options are available and will often be used on formal and/or high-quality landscaping projects. These include self-binding materials like [Cedec® Footpath Gravels](#) and [Firechip™](#) however regional variants will exist and should be investigated as transportation costs to sites outwith Central Scotland may make the use of these specific materials prohibitive.

### Ultitrec® (previously called Toptrec®)

#### Description

Ultitrec® is a 100% recycled, path specific material that is now manufactured in Scotland by [Earth Solutions](#) (previously by Tarmac Ltd.) and produced from red mining shale waste (blaes), graded construction waste and road planings. A minimum content of road planings is used to enhance the binding of materials and to assist in material laying and compaction. Aggregates are typically graded from 20mm diameter to 'dust' (<1mm) and show excellent compaction properties; providing a smooth and durable shared-use surface which is particularly suited to rural or urban fringe settings. It provides a versatile and cost-effective surfacing option for a variety of locations such as woodland paths, canal towpaths, cycle ways and public parks. Ultitrec® is produced in both black and red colour variants. 'Black' is predominantly formed from road planings and 'red' is formed from blaes, construction waste and a lesser quantity of road planings.

# Semi-bound surfaces

## Suitability

As a semi-bound material, it will provide a notably more stable and durable surfacing layer than unbound materials making it better suited to higher wear situations e.g. woodland walks, cycle paths and on routes which have linear gradients steeper than 1:8 / 12.5% / 7°. Compaction of Ultitrec® (as with DBM or HRA) is best achieved when there is a firm edge to compact against and the product supplier recommends the use of a timber edge or concrete kerb. If this isn't possible, the installation of a sacrificial edge to the base layer, of up to 250mm on either side (but not less than 150mm), is highly recommended. Ultitrec® is not as durable a surface as a bound material however it can be repaired by unskilled operatives.

## Benefits

- 100% recycled and inert product made from screened construction waste, blaes and road planings
- available in two colours – 'black' and 'red'
- an easily workable material which does not harden quickly after delivery. This allows plenty of time for getting the material into difficult work sites and stockpiling for a few days
- a more robust surface on steeper gradients where an unbound surface (e.g. whin dust) might wear away more quickly
- a suitable and cost-effective alternative to unbound surfaces or where a bound surface is either too expensive and/or not esthetically acceptable in the landscape setting
- highly durable surface and especially suited to woodland paths where water dripping off trees would quickly 'wash out' an unbound surface
- lower installation costs than a bound surface
- relatively straightforward to maintain and repair areas of restricted damage
- typical lifespan of 10-15 years

# Semi-bound surfaces

## Limitations

- limited availability with only two depots in Scotland (Hillwood nr. Edinburgh and Bogmoor Road, Glasgow) meaning haulage costs can sometimes be prohibitively high if the work site is further afield
- material is quite a bit more expensive per supplied tonne than unbound material (e.g. whin dust) and needs to be laid to a min depth of 50mm (max depth 100mm) meaning 2-4x is required when compared to a 25mm depth of unbound surfacing material
- best applied using a mini-paver or drag box, which makes it less suitable for volunteer led installation
- Ultitrec® 'black' is slightly less durable than red but is generally cheaper to purchase
- Ultitrec® can take as long as a week to set properly, dependent on weather conditions. It is advised that users (especially horses and bikes) are kept off the path during this period

## Cost

£22.25 - £38.10/m<sup>2</sup>

## Technical resources

[Ultitrec® Path – Paths for All Standard Detail Drawing & Specification Details](#)

[Ultitrec® Product Brochure](#)

[Ultitrec® Safety Data Sheet](#)

[Ultitrec® Laying Guide \(2016\)](#)

# Semi-bound surfaces

## Images



Ultitrec® (Red)



Ultitrec® (Red) Path



Ultitrec® (Black)

## Cedec® (red/silver/gold)

### Description

A graded granite and quartzite aggregate (6-0mm grit size) which binds together, in the presence of moisture, to form a firm, hard wearing but porous surface. Sold as a footpath gravel but often used on larger areas where a more decorative finish is desired, including driveways and high quality/impact landscaping projects.

### Suitability

Like Ultitrec®, Cedec® has very good binding and compaction properties which, if properly laid and once hardened, provides a smooth and durable surface but with good levels of porosity. As a self-binding material, it will typically provide a more stable and durable surfacing layer than unbound materials however its relatively high cost, increased depth of application (65mm depth, compacted to 50mm) and added complexity in laying make it less suitable for typical path surfacing unless a more decorative finish is required and/or the path is relatively short.

# Semi-bound surfaces

## Benefits

- available in three colours of gold, silver and red
- composed of chemically inert granite and quartzite grit
- particularly suited to more formal landscaping projects where surface colour and texture are important considerations
- durable and porous finish which is laid to compacted depth of 50mm (65mm depth before compaction)
- typical lifespan of 10-15 years

## Limitations

- limited availability through [CED Stone](#) with the only Scottish depot being located at Bonnybridge near Falkirk
- high material costs may be prohibitive for anything other than shorter routes or very high visual impact projects
- application procedure is more involved than unbound materials and is recommended to be laid within a hard edge, applied when moist and then further rolled after additional water is added. This will increase installation costs and makes it a more complex task for inexperienced contractors or unskilled workers e.g. volunteers
- depth of application is greater than 2x that recommended for whin/granite dust however durability is increased as a result

## Cost

£26.25 - £36.10/m<sup>2</sup>

## Technical resources

[CEDEC Footpath Gravel Information](#)

# Semi-bound surfaces

## Images



## Firechip™

### Description

Formed from red granite aggregate that has been crushed and graded from 8-0mm. Used extensively for golf course pathways, Firechip™ is ideally suited to installation as a path surfacing layer where its distinct red colour is the desired finish. Material is easily laid and maintained making it suitable for unskilled application.

### Suitability

Popular for golf course paths, walkways, amenity areas and some cycle paths; Firechip™ is free draining and will not break down under traffic. Initial rolling of the surface is preferable however it is not essential as Firechip™ should compact naturally with traffic and, it is claimed by the supplier, is virtually maintenance free however occasional raking will ensure a continued smooth finish.

# Semi-bound surfaces

## Benefits

- free draining and pleasant to walk on but also capable of carrying heavier vehicular traffic
- formed entirely from crushed red granite with a uniform colour
- lighter in weight than other unbound materials meaning that a tonne of this product will surface a greater area of path than other unbound material (typically surfaces 10sqm/tonne at 50mm depth)
- impervious to frost
- can create a visually distinct path appearance, which may be useful in specific applications where high contrast is desirable
- laid to a min of 50mm depth on paths and 75mm where vehicular traffic might be expected; similar to other semi-bound/self-binding gravels
- easy to lay and maintain, especially as the use of compaction equipment is not essential
- doesn't require skilled operatives or specialist machinery
- suitable for volunteers to apply and maintain
- typical lifespan of 10-15 years

## Limitations

- single supplier based in South Lanarkshire, which may result in transportation costs being prohibitively high for projects that are further afield
- has historically been used on golf course pathways and, whilst suitable for many other applications, some may only associate it with this type of use and feel it is visually unsuitable for rural/semi-rural paths
- best suited to paths with gentle gradients (gradients not exceeding 1:8 / 12.5% / 7°)

## Cost

£25 - £36.10/m<sup>2</sup>

# Semi-bound surfaces

## Technical resources

[Cloburn Quarry Website](#)

[Cloburn Quarry Red Aggregate Brochure](#)

## Images



# Bound surfaces

## General description of bound materials

Bound (or sealed) surfaces use a binder, typically bituminous but can be resin based, to bind or 'glue' aggregate together. This top layer is called the 'surface course', a term commonly used in road and pavement construction and differs from the term 'wearing course' which is applied to unbound and semi-bound/self-binding path surface materials. Bound surfaces are much more durable than an unbound or semi-bound/self-binding surface as the binder will prevent the aggregate being washed or quickly worn away. The most commonly used materials are bitumen macadam (bitmac) or hot rolled asphalt (HRA). This type of surface can be manufactured to vary slightly in terms of hardness, something that is referred to as 'bitumen penetration grade'. The higher the penetration grade the softer, and smoother, the material will be. For further advice on the many variations in bound surfacing materials see [Sustrans - Technical Information Note No. 8](#)

## Tarmac

### Description

Also known as Bitmac and Dense Bitumen Macadam (DBM). A surfacing technique that requires a paving machine to achieve the highest quality laying and finishing although it can be laid and worked by hand to smaller areas and/or where access is limited. The mixture of hot bitumen and graded aggregate is spread over a prepared base layer and rolled, when still hot, to provide a closely bound and highly durable surface layer. Typically laid with a 1:50 crossfall however any bitmac surfaces that are hand laid with a camber should avoid any excessive thinning of material to the edges. This can create weakness and potential surface failure/cracking, particularly if the compacted base material does not extend beyond the finished surface edge.

# Bound surfaces

## Suitability

Properly constructed bitmac surfaced paths will create a very smooth, strong and durable finish which can last for 30 years, or more, without significant repairs or other surfacing maintenance being required. It is particularly suited to urban paths and/or strategic 'active travel' routes which require a smooth, hard and durable finish. That said, winter frost, ice and snow can make these surfaces treacherous for users and regular applications of salt/grit may be a requirement during those periods. Similarly, leaf litter can also quickly create a very slippery surface meaning overhanging trees may need to be cut back and/or leaf clearance included within any maintenance schedule.

## Benefits

- very durable, easy to maintain and suitable for most path user types, allowing all year-round use
- more comfortable for use by cyclists and wheelchair users due to the very smooth finish
- lower annual maintenance liability due to high levels of durability
- allows for variable aggregate sizes to be used (typically 6mm or 10mm for paths) that will allow variations in porosity, strength and smoothness
- can be over painted for user segregation and/or safety
- can be applied to steep ramps where it will resist water scouring far better than unbound and semi-bound materials
- relatively simple to repair damage (e.g. potholes) than some other bound surfaces
- withstands high levels of path user traffic
- experienced 'tarring' contractors are readily available throughout Scotland
- typical lifespan of 30+ years

# Bound surfaces

## Limitations

- may not be ideal for more rural paths where a more landscape 'sensitive' appearance is preferred
- significantly more expensive than all unbound, and most semi-bound, path surfacing materials
- specialist equipment and skilled labour required for installation making any volunteer application highly unlikely
- typically requires excellent site access for heavy, specialist machinery although it can be transported using smaller dumpers and laid with a mini paver
- although most path users will benefit from a high specification bitmac surface, it is not favoured by horses where its unforgiving, smooth surface can be very slippery and potentially dangerous for horse and rider (grit can be rolled onto newly laid surface to aid anti-slip qualities)
- Only available in black though typically does weather to a dark grey within a couple of years

## Cost

£31.80 - £48.80/m<sup>2</sup> (excludes concrete kerbing or other hard edge)

## Technical resources

[Dense Bitumen Macadam \(DBM\) Path – Paths for All Standard Detail Drawing & Specification Details](#)

[Standard DBM Path Cross Section - Sustrans Standard Detail Drawing](#)

# Bound surfaces

## Images



## Hot rolled asphalt (HRA)

### Description

Hot rolled asphalt (HRA) is a dense mixture of aggregate, sand and bitumen that complies with EN 13108. Typically, there is a high proportion of sand in the asphalt mix resulting in a low percentage of air voids when thoroughly compacted although the actual proportions of aggregate and sand can vary, depending on end application.

### Suitability

Hot rolled asphalt (HRA) can be used for path surfacing but is more typically used for roads, urban pavements and on some strategic active travel routes. Embedding 20mm dia. bitumen coated stone chippings into the hot surface, at the point of rolling/compacting, will further assist in providing an enhanced surface durability and traction.

# Bound surfaces

## Benefits

- many of the benefits of bitmac also apply to HRA
- more flexible than bitmac which allows for some surface deformation before breakage occurs
- very smooth and hardwearing (durability greatly enhanced with addition of coated stone aggregate)
- can be painted for user segregation and/or safety
- competent 'tarring' contractors are readily available throughout Scotland
- typical lifespan of 30+ years (increased with addition of coated stone chippings)

## Limitations

- more difficult to lay than bitmac, requiring specialist contractors
- requires excellent access for heavy, specialist machinery and, unlike DBM, cannot be laid in anything other than reasonably good weather conditions
- can be very slippery when wet or covered in ice/snow/leaves; this is especially important for horses. To aid this, grit can be rolled onto newly laid surface to enhance anti-slip qualities, but this may well counter one of the principle reasons for specifying HRA i.e. to create a smooth and even surface
- only available in black however different coloured 6mm stone chips can be applied when rolling, to give a speckled appearance (see image below)

## Cost

£35.80 - £52.80/m<sup>2</sup> (excludes concrete kerbing or other hard edge)

## Technical resources

[Standard Detail Drawing - Paths for All - Hot Rolled Asphalt Path](#)

# Bound surfaces

## Images



## Porous asphalt

### Description

Created in a similar way to standard HRA but where the finer sand particles are removed from the aggregate mix; forming voids in the structure which allow water to pass through. As with other porous surfacing options, the base of any path will also need to be constructed in a way that allows for increased porosity but without impacting structural integrity.

### Suitability

Primarily used in urban situations where reducing surface water run-off is an important design factor. With the removal of finer particles from the asphalt composition, porous asphalt will have a slightly rougher texture making it less slippery for path users. There is a tendency for initial porosity levels to diminish quite quickly, particularly in low trafficked or woodland areas where silt and/or vegetative matter can rapidly clog the 'pores'.

# Bound surfaces

## Benefits

- initially offers good levels of surface porosity reducing surface water run-off
- it has a long service life and can be recycled
- can be painted for user segregation and/or safety
- can be produced by most suppliers of coated materials
- competent 'tarring' contractors are readily available throughout Scotland
- typical lifespan of 20+ years

## Limitations

- it is generally more expensive than standard hot rolled asphalt, but is laid in the same way
- underlying base also needs to be porous making overall construction costs higher
- pores/voids that create porosity can become easily blocked

## Cost

£35.80 - £52.80/m<sup>2</sup>

## Technical resources

[Hot Rolled Asphalt Path - Standard Detail Drawing & Specification Details](#)

## Images

**As per hot rolled asphalt (HRA)**

## Coloured asphalt

### Description

Coloured asphalt is created through the replacement of a bitumen binder with a clear binder thereby allowing the use of different coloured aggregates, including naturally coloured grits and ones that have been treated with coloured pigments.

### Suitability

Although more expensive to purchase, coloured asphalt is particularly useful for providing a visual segregation on paths e.g. cycling facilities within urban areas or to simply enhance the visual impact of the area being surfaced.

### Benefits

- applied using the same equipment as standard bitumen asphalt
- same structural integrity as black asphalt
- can be painted for user segregation and/or safety markings
- different coloured aggregates available, including fluorescent
- competent 'tarring' contractors are readily available throughout Scotland
- allows for distinctive design, visual segregation and possible safety enhancement where differing colours of material are used on paths

### Limitations

- clear binder can be 2x the cost of bitumen binder. That said, the binder is only applied in relatively small quantities so cost increase may not be prohibitive when compared to standard bitumen asphalt
- non-naturally coloured aggregates will wear more rapidly and the desired visual effect will be lost. Areas of variable wear will also detract from the desired visual appearance

# Bound surfaces

## Cost

Highly variable. Check with supplier and/or installer

## Technical resources

[Hot Rolled Asphalt Path - Standard Detail Drawing & Specification Details](#)

## Images



Coloured Asphalt (other colours are available)

## Resin bound grit

### Description

A thin layer surfacing technique where single size stone chippings are 'glued' together with UV resistant resin. The resultant mixture is then applied directly to an existing, or newly laid, bound surface or to a well formed granular sub-base (e.g. Type 1); forming a porous, hard-wearing surface with a smooth and attractive appearance. There are a range of proprietary resin bonded surfacing products available.

# Bound surfaces

## Suitability

This type of application is typically very expensive and will often be used only in limited areas or where the visual impact/aesthetic of the surface is of considerable importance e.g. high-quality urban landscaping projects, areas around listed properties, etc. This material does provide a surface texture, which improves grip for pedestrians, cyclists and horse riders. It can also be used to change the colour of an existing black bitmac or asphalt path and therefore greatly enhance its visual impact.

## Benefits

- variable grit sizes available between 6 and 12mm
- many different grit colours are available to create bespoke surfaces (see samples below)
- very hard wearing yet with structural voids which enable high levels of porosity

## Limitations

- Laid by hand trowel and requires specialist installers
- Very expensive for path work and better suited to smaller areas and/or high quality/high impact landscaping projects

## Cost

Highly variable. Check with supplier and/or installer.

## Technical resources

[Bound Gravel Path - Standard Detail Drawing & Specification Details](#)

# Bound surfaces

## Images



## Bitumen bound tar spray & chip

### Description

Can be laid as either a single or double layer application whereby a bitumen emulsion is sprayed onto an existing 'unbound', 'semi-bound' or worn 'bound' surface and a layer of washed, single size stone chippings are rolled in (a double layer application is where this process is repeated).

### Suitability

A particularly useful way of upgrading existing suitable path surfaces at a relatively low cost. It also allows individual ramped sections of path to be treated, to aid surface durability and traction, but without the additional cost of a bound surface e.g. bitmac or HRA.

# Bound surfaces

## Benefits

- variable grit sizes available between 6 and 12mm
- many different grit colours available to create bespoke surfaces
- it is a more durable surface than unbound or semi-bound surfacing materials, particularly in places that get heavy wear and tear or that might be occasionally affected by flowing surface water
- can be laid as a single layer or as a far more durable double layer
- can add surface texture and grip to a smooth bitmac or asphalt surface
- can be quickly applied to refresh an existing and worn bitmac surface thereby reducing repair costs and prolonging the lifespan of the path
- lowers ongoing maintenance costs due to high levels of wear resistance
- competent 'tarring' contractors are readily available throughout Scotland
- typical lifespan of 10-15 years

## Limitations

- typically needs to be applied to an existing and clean semi-bound or bound surface. If applied to a stone surface (e.g. Type 1) then 2 layers of surface treatment are required
- requires specialist skills and equipment

## Cost

£15 - £35/m<sup>2</sup> (in addition to the costs associated with building a suitable path sub-base, if required)

## Technical resources

[Standard Detail Drawing & Specification Details – Paths for All – Surface Dressed Path](#)

# Bound surfaces

## Images



## Fibredec®

### Description

'Fibredec®' is a proprietary material which has a layer of chopped glass fibres inserted between two layers of bitumen emulsion binder before immediately applying a surface layer of washed stone chippings. This provides a high tensile strength, crack resistant, thin surface layer on top of new or existing base layer or existing surface layer e.g. a worn bitmac path.

### Suitability

A durable path surfacing material which has been used extensively along canal towpaths, where it also offers increased resilience to slow flowing water during periods of flood.

# Bound surfaces

## Benefits

- highly versatile. Can be applied to a variety of sites including: carriageways, car parks, parks and recreational areas, footpaths, towpaths, cycleways and driveways
- many different natural and pigmented grit colours are available to create bespoke surface appearances
- it is a more durable surface than unbound or semi-bound surfacing materials, particularly in places that get heavy wear and tear or that might be occasionally affected by flowing surface water
- can be laid as a single layer or as a far more durable double layer
- can add surface regulation, texture and grip to an existing smooth bitmac or asphalt surface
- can be quickly applied to refresh an existing but worn surface; reducing repair costs and prolonging the lifespan of the path
- lowers ongoing maintenance costs due to high levels of wear resistance
- typical lifespan of 15-20 years. Higher grades of binder and aggregates can significantly increase durability

## Limitations

- if applied to a prepared stone surface (e.g. Type 1) then 2 layers of surface treatment are normally required. Typically, only 1 layer is required when applied to an existing bound surface
- time requires to be spent ensuring that the lower bound base layer is laid to a high standard and with little or no undulations as this type of surface application will reflect any irregularities
- requires specialist skills and equipment. Process is licensed to Colas Ltd.

## Cost

£20 - £32/m<sup>2</sup> (in addition to the costs associated with building a suitable path sub-base, if required)

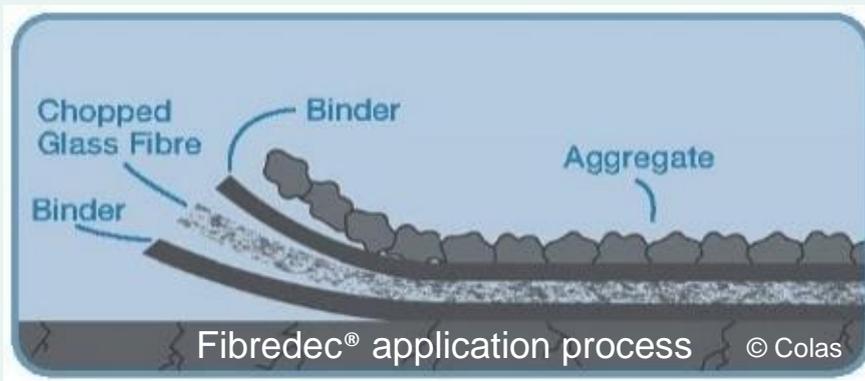
# Bound surfaces

## Technical resources

[Standard Detail Drawing & Specification Details – Paths for All – Surface Dressed Path](#)

[Fibredec® - Heritage Surfacing Brochure](#)

## Images



## KBI Flexi™-Pave

### Description

KBI Flexi™-Pave is a trademarked product that uses recycled car tyres, stone and a polyurethane bonding agent to form a highly flexible and porous paving product.

### Suitability

KBI Flexi™-Pave is designed to have very high levels of porosity, making it ideal for urban applications where reducing surface water runoff is an important design factor. The excellent impact absorption, anti-slip qualities, ability to flex and variable grit colours make it well suited for path surfacing however higher costs, limited approved contractors and specialised application may reduce viability on anything other than very high use, urban or other strategic routes.

# Bound surfaces

## Benefits

- sustainable product which is manufactured from recycled car tyres
- very high levels of porosity, helping to stop ponding and ice forming on path surface
- compatible with SUDs systems
- highly chemical resistant
- high levels of durability and very low maintenance
- good impact absorption
- ideal for paths through play areas
- suitable for all path users, providing a durable and comfortable surface
- non-cracking
- available in 5 base colour options for grit (e.g. gold, pink, grey black and red) with further shade variations of each
- excellent anti-slip qualities due to rubber content

## Limitations

- product can only be applied under license with limited numbers of approved installers (none known in Scotland at time of issue)
- may be prohibitively expensive for some paths where unbound or semi-bound surfaces would be a more cost-effective solution
- not ideal where a 'shuffle' surface layer is desired for less able path users who may drag feet when walking

## Cost

£30-£38/m<sup>2</sup> (in addition to the costs associated with building a suitable path sub-base)

## Technical resources

[KBI Flexi™-Pave](#)

# Bound surfaces

## Images



## Smart Surface®

### Description

The active ingredient to 'Smart Surface®' is Ecoproactive™; a trademarked inorganic hydraulic binder product that was originally developed for use in soil stabilisation but has been found to be effective in stabilising quarried and recycled granular materials used in path and road construction. The process involves an initial rotovation of existing substrate material to which the Ecoproactive™ powder is applied and mixed before finished profiles are formed and compacted.

### Suitability

An effective way of substantially upgrading an existing/worn path sub-base at a relatively low cost and possibly without the need for importation of any additional aggregate (will be dependent on various on-site factors including substrate suitability, finished levels, etc).

## Benefits

- allows existing, worn out paths to be revitalised and upgraded, potentially with limited/no need to import any granular materials for the base or surface layers
- different coloured surface dressing grits (6mm) can be added, before the binder had fully hardened, to form a uniform and bespoke finish to the path whilst also improving anti-slip qualities
- where granular material does need to be added to the existing path, it can be in the form of lower cost recycled products (e.g. road planings or blaes) or cheaper quarried aggregates (e.g. scalpings)
- better landscape 'fit' in rural paths where bitumen based surfacing products may not be suitable or desirable
- process allows for repairs to be undertaken to isolated sections of a path however product needs to be pre-mixed before installation
- high levels of durability with very high levels of load bearing capacity possible (CBR tests of >300% have been achieved)
- very low levels of porosity which will help avoid frost heave
- can be added to form step treads but requires to be mixed separately and before importation
- suitable for all path users, providing a durable and comfortable surface
- very low maintenance expected on the finished path surface
- typical lifespan expected to be in excess of 25 years, although product is relatively new to the market and remains unproven over this timescale

# Bound surfaces

## Limitations

- product can only be applied under license with one contractor in the UK (MacKenzie Construction Ltd.) who are based near Glasgow. This contractor is currently promoting the process as “Smart Surface® “
- requires specialist equipment to prepare path base substrate and then adequately mix the product
- can only be applied in temperatures of 5°C and rising
- may require up to 48-72hrs before vehicular traffic can use path
- not currently suitable for path widths less than approx. 2m; due to dimension of application equipment, although a finished path width can be reduced when forming verges
- suited mainly for paths which do not have a requirement for hard edge or kerb, due to process involved
- requires thorough compaction to ensure structural strength and integrity; sometimes difficult to achieve along path edges thus resulting in possible weakness. May be overcome by constructing path slightly wider than required finished width and pulling in the finished verge across the edge i.e. sacrificial edge (see Ultitrec®)
- requires careful monitoring of moisture content to ensure adequate mixing and binding of Ecoproactive™ powder to substrate. Will require water to be added in dry conditions

## Cost

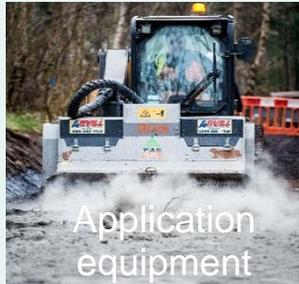
£25.00 - £35.00/m<sup>2</sup> (dependent on suitability of existing substrate material and subsequent need for any importation of material, which will increase costs)

## Technical resources

[Mackenzie Construction – Smart Surface®](#)

# Bound surfaces

## Images



# Other path surfaces

## Reinforced grass

### Description

Formed from interlocking plastic 'cellular' paving, it is typically laid on a level topsoil bedding layer over Type 1 and geotextile. The individual 'cells' are filled with topsoil and seeded with an amenity grass seed to provide a durable, grassed surface.

### Suitability

Cellular paving, with a well-established and continuous grass covering, can provide a durable and natural looking surface which is also suited to use by horses. It is most effective in areas where a good grass sward can be easily established meaning shaded, woodlands paths, etc are typically not workable options using this system. Reinforced grass surfaces also require regular maintenance during the growing seasons otherwise the walking surface can rapidly become overgrown, although regular path 'traffic' can often 'naturally' limit excess growth.

### Benefits

- a reinforced grass surface allows path network development where imported aggregate materials would not be permitted or where the visual impact of a hard surface is not desired
- a reinforced grass surface is permeable and well-established grass paving can work effectively in areas that are prone to flooding
- it is very robust and performs well with a low-quality cell infill material, eliminating the need to import large quantities of soil to the site i.e. topsoil dug from the formation tray can be re-used once larger stones and vegetative matter has been removed

# Other path surfaces

## Benefits (contd.)

- a good selection of cellular paving systems is readily available; to accommodate anticipated loads, high volumes of user types, existing ground conditions, drainage and budget
- often utilised in situations where emergency vehicular access routes are incorporated within open grassed areas, without having to install a wide bound surface. This may include a reinforced strip along each side of an existing path to support vehicular wheels
- has been used on coastal paths where readily available free draining sandy soil is an ideal infill material
- easy to maintain, where typical grass cutting machinery is available
- durability is excellent, especially where an adequate grass sward can be maintained. A well-formed reinforced grass would have an expected lifespan of 20+ years
- cellular systems are now frequently made from 100% recycled plastics

## Limitations

- most systems require to be built on a well-formed base with geotextile and granular infill meaning construction costs can be high; in some instances, more expensive than a bound surface e.g. bitmac (costs can be reduced where suitable infill material is readily available on-site from other works or tray excavations)
- can take some time to establish a satisfactory grass sward meaning path users will need to be kept off the path for 6-10 weeks

## Cost

£25.00 - £60.00/m<sup>2</sup>

## Technical resources

[Standard Detail Drawing - Paths for All – Reinforced Grass Path](#)

# Other path surfaces

## Images



# Glossary of terms

<b>aggregate</b>	graded stone used to form the sub-base, base and surface layer of a path. Available in various sizes and is often the term given to all quarried stone
<b>‘as dug’</b>	material excavated on-site and used for fill or to construct path base, usually without any crushing or grading
<b>asphalt</b>	bituminous binder mixed with sharp sand and small sized clean gravel. Typically used for highest quality roadway, pavement and path surfacing
<b>bitumen</b>	a refined and viscous oil-based product, used as a binder to form a macadam (Bitmac)
<b>blaes</b>	red coloured industrial waste material, made by crushing shale rock derived from mining waste
<b>borrow pit</b>	a small-scale on-site excavation (mini quarry) from which suitable aggregate can be obtained for path construction
<b>camber</b>	a curved path surface where the middle is higher than both outer edges. Allows water to flow off both sides of a path
<b>cross-fall</b>	a cross gradient on a path where one edge is higher than the other. Allows water to flow off lower side only
<b>DBM</b>	dense bituminous macadam. Bitmac which is made with a graded aggregate to form a uniform surface finish with no voids
<b>drag box</b>	stone laying equipment comprising a hopper mounted on a sledge with an adjustable grading blade to vary laid depth of material. Typically, filled from a dumper which then ‘drags’ box along the ground to form path base and then surface layer

# Glossary of terms

## **edging (soft/hard)**

'soft' refers to the use of soil/turfs to support the path edges. 'Hard' refers to the use of timber boards, concrete kerb, or other hard edge, to form/support the path edge

## **fines**

term describing the smallest particles in graded aggregate or within 'as dug' material. Important to the binding properties of any material

## **formation**

prepared ground on which a path base is laid

## **free-draining**

material, aggregate or ground which allows the free passage of water through it

## **frost heave**

describes action of freeze/thaw on a path surface. Water that is held within an insufficiently compacted surface material can freeze then expand, causing that material to seemingly increase in volume (heave). When thawed, the material will be loose and soft until further compacted

## **geogrid**

a strong plastic mesh/grid, with open square or triangular holes, often used as a reinforcement on softer grounds

## **geotextile**

a strong synthetic woven sheet that allows water, but not soil/fines, to pass through. Often used as a weed suppressant and as additional support to the path base. Can also be used as a filtration membrane for drains

## **gradient**

angle or slope of the ground or path. Measured in height gained over horizontal distance (e.g. 1 in 12 or 1:12); as a percentage (e.g. 8.3%) or in degrees (e.g. 4.8°). Linear gradient refers to the slope along the path

## **granite dust**

a crushed granite rock dust (6-0mm in size) used as a surface layer of a path (wearing course)

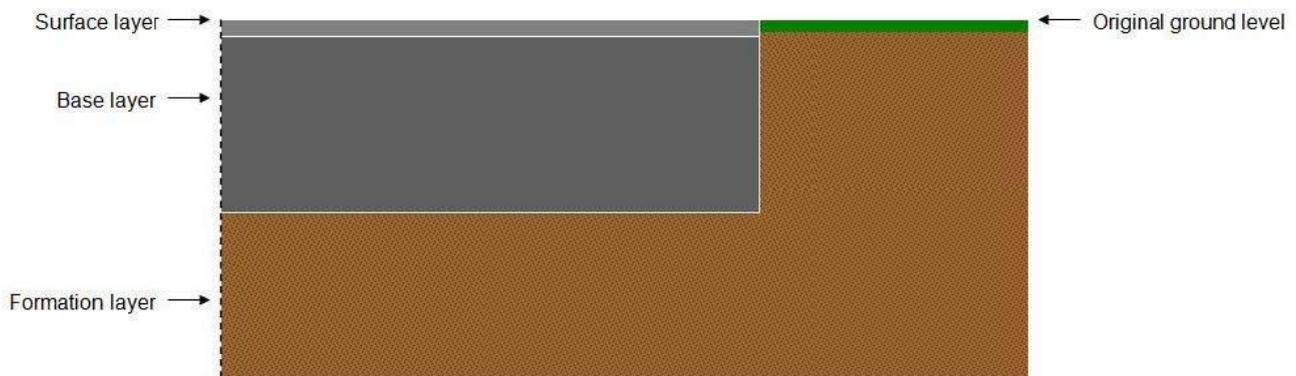
# Glossary of terms

<b>maintenance</b>	routine inspection and minor repair of a path on a regular basis. Includes the clearance of drains, minor surface repairs, vegetation clearance, etc
<b>landscape fit</b>	the design and construction of a path that aims to ensure it does not negatively impact the visual, or environmental, aspect into which it is constructed. Can include consideration of surface material / finish / colour and line of path (e.g. avoidance of long straight lines)
<b>path tray</b>	an excavated rectangular tray, to the desired width and depth, into which the base stone is laid
<b>semi-bound</b>	sometimes referred to as 'self-binding', this term describes materials that have cementitious like properties which allow them to harden after wetting and thorough compaction
<b>spoil</b>	soil and stone left over from digging a hole, trench or path tray
<b>surface layer</b>	top layer of a path. Typically refers only to bound surfaces (e.g. asphalt)
<b>type 1</b>	a material that can be made from crushed limestone, granite or clean concrete. The crushed material is screened into a mix of larger (40mm) and smaller (<2mm) sizes. To be classed as 'Type 1' it must comply with the Department of Transport Specification for Highway Works, clause 803 (SHW 803)
<b>wearing course</b>	top layer of a path. Typically refers to all non-bound surfaces (e.g. whin dust)
<b>whin dust</b>	a crushed limestone rock dust (6-0mm in size) used as a surface layer of a path (wearing course)

# Cross section of a new path

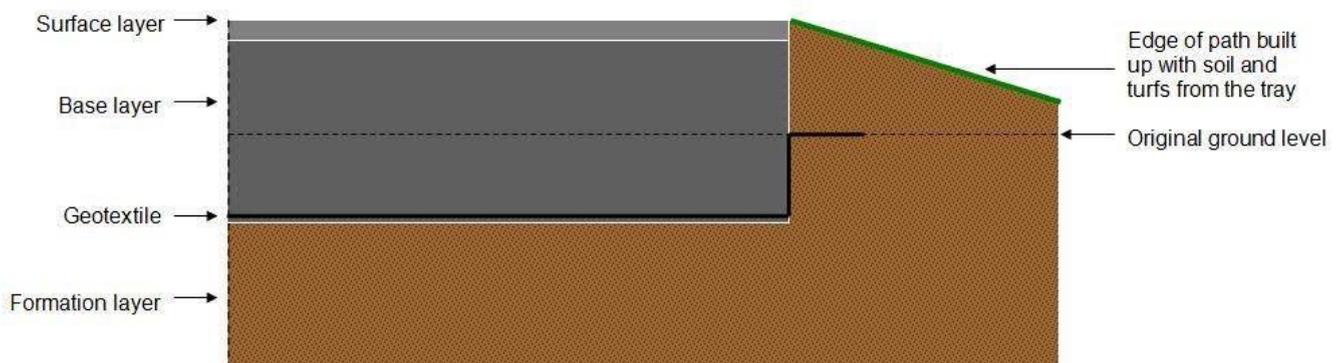
If new to path building, we thought it might help to see what a new path will look like from the side. Look at cross section diagrams below to get an idea of a full and half-tray construction technique.

A well-drained path crossing hard ground would look like this. Notice that the surface layer of the path is level with the ground. This is referred to as a **full-tray** construction.



If the ground is soft or wet, the path is typically raised slightly above adjacent ground level to allow all water to run-off the path surface and into the adjacent ground or drainage feature.

In the diagram below, you will see that the surface layer now sits above the ground. This is referred to as a **half-tray** construction.



For further information on path building please visit [www.pathsforall.org.uk](http://www.pathsforall.org.uk)

# Acknowledgements

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Front cover photo: Section of the Clyde Walkway, nr. Blantyre in South Lanarkshire

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