

Charcon Highway®



Highway® is a high capacity combined kerb and drainage system, offering a cost-effective all-in-one alternative to conventional kerb, gully and drain networks.

- A two-part high capacity channel base unit and a soffit for channel top unit
- Dramatically reduces the need for expensive underground pipe work and cost of excavation
- Inlet holes along the kerb line for fast and effective removal of water from the road surface
- Large capacity channel that stores and removes water to an outlet, removing the need for frequently placed outlet points
- Supplied in pallet packs for easy manoeuvrability on site and packed to suit manual handling
- Available in both half batter and sloped profiles
- Cast in recess for sealing mastic.

Manufacturing standard

Highway is manufactured using both wet pressed and semi dry processes and tested in accordance with European Standard BS EN 1433.

All Aggregate Industries products are manufactured in accordance with ISO 9001 with factory compliance to ISO 14001.

Performance

Strength: The strength requirements are met to the manufacturing standard. Loading standard conforms to EN 1433 Class D (Class D = 400kN: Public highways and general parking areas).

Complementary products

Designed for use with British Standard kerb.



Colour swatch



1. Grey

Applications

Highway is suitable for motorways, dual carriageways, commercial sites, industrial sites and access roads.

Highway

Dimensions (mm)	Base unit	Top unit
Length	400	400
Width (overall)	460	460
Depth (overall)	369	245
Weight (approx. kg)	84	67
Colour available	Grey	Grey

Available from stock and supplied in pallet packs: (base) 16 units and (top) 8 units.
 Channel dimensions 300x300mm (approx.)
 Inlet dimensions 65x150mm ellipse (approx.)

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Highway Accessories

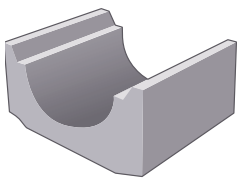
Dimensions (mm)	Length (mm)	Depth (mm)	Width (mm)
Deep base unit*	400	440	460
Shallow base unit*	400	222	460
Crossing base unit	400	310	460
Base outlet unit	400	369	460
Crossing base plate	400	12.5	360
Base junction unit*	400	369	460
Base unit with ductile iron grid	400	419	460
Base unit with concrete drainage top*	400	504	460
Silt box top cover	400	245	460
Cable duct unit	400	245	460
Combined base junction / outlet unit*	400	369	460
Shallow base outlet*	400	444	460
Bolted access for use with ductile iron grid*	-	-	-
Crossing base unit bend*	-	-	-
Textured top unit option*	-	-	-
Painted top unit option*	-	-	-
Porous asphalt top unit option*	-	-	-

* - Available on a MTO basis

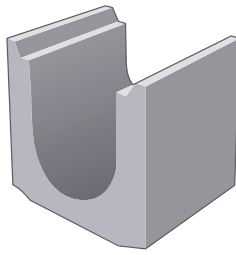
Radius units: 25/11, 10/8, 7/6 metre versions, for internal and external radii.

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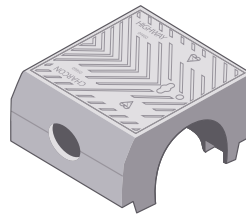
Accessory units



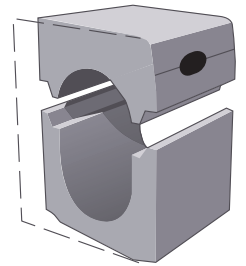
Highway shallow base unit



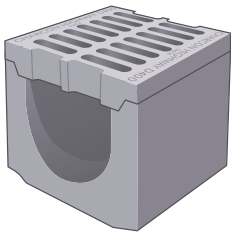
Highway deep base unit
(for extra capacity)



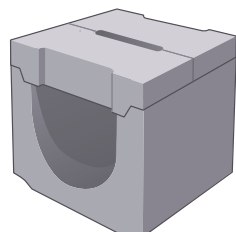
Highway silt box top and
cover 01460 (ductile iron)



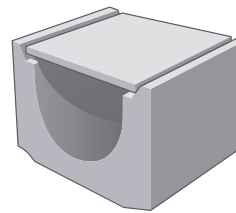
Highway external radius unit
Also available: internal radius (dotted)



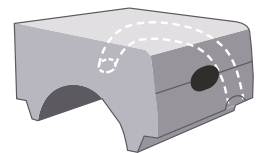
Highway base unit with Ductile
iron grid 01604 (class D400 & E600).



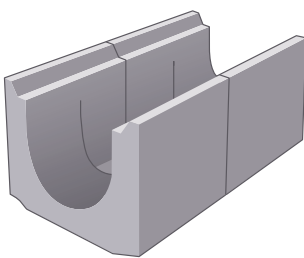
Highway base unit with concrete
drainage top



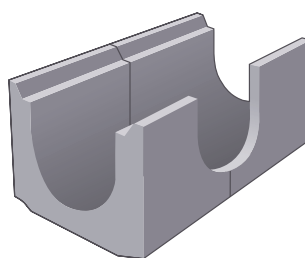
Highway crossing base unit
(with galvanised steel plate)



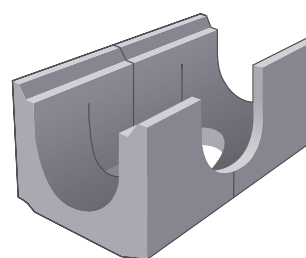
Highway cable duct unit



Highway outlet units (two units
form outlet)



Highway junction unit
(two units to form one junction)



Combined outlet/junction unit

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General principles

The aim is to ensure prompt and cost-effective removal of surface water during and immediately after rainfall.

Multiple inlet holes and the continuous U-shaped channel profile enable system design which minimises underground pipework. This can provide a lower-cost solution than traditional gully systems.

System capacity

For Highway drainage, identify any flow constraints in advance, including:

- vehicular crossings requiring crossing base units
- tight radii*
- junction units creating turbulent flow*
- outlet unit capacity
- outfall chamber/pipe capacity
- linear grates.

Note: * Hydraulic properties given in tables are conservative and so, in most cases, any flow reductions arising from these factors may be ignored in design.

In common with all combined kerb and drainage systems, Highway top and base units will NOT run full due to turbulence from the inlet holes. System flow capacities, given in the table below, are therefore confined to realistic flow levels rather than theoretical/full bore maximum levels.

Capacities vary according to type of base unit installed in the system, (standard, shallow, deep or crossing base units - see table below).

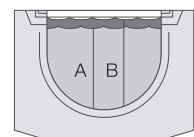
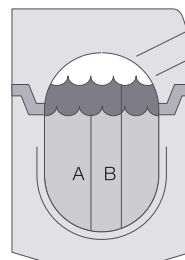
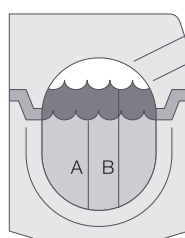
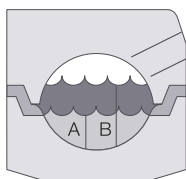
Note: Capacity will be reduced over time wherever there is a likelihood of a significant build-up of silt.

Highway system flow capacities

Gradient	Shallow base unit				Standard base unit				Deep base unit				Crossing base unit			
	To bottom of joint line (A)		To inlet invert inside top unit (B)		To bottom of joint line (A)		To inlet invert inside top unit (B)		To bottom of joint line (A)		To inlet invert inside top unit (B)		To bottom of joint line (A)		To underside of crossing plate (B)	
	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec	vel. m/sec	dis. l/sec
1:50 (2.00%)	1.9	39	2.3	97	2.6	171	2.7	236	2.8	244	2.9	310	2.4	115	2.6	178
1:100 (1.00%)	1.3	28	1.6	69	1.9	120	1.9	166	2.0	172	2.0	219	1.7	81	1.8	126
1:200 (0.50%)	0.9	20	1.1	48	1.3	85	1.4	117	1.4	121	1.4	154	1.2	57	1.3	89
1:300 (0.33%)	0.8	16	0.9	39	1.1	69	1.1	95	1.1	99	1.2	126	1.0	46	1.1	72
1:400 (0.25%)	0.6	14	0.8	34	0.9	60	1.0	83	1.0	85	1.0	109	0.8	40	0.9	62
1:500 (0.20%)	0.6	12	0.7	30	0.8	53	0.9	74	0.9	76	0.9	97	0.8	36	0.8	56
1:1000 (0.10%)	0.4	9	0.5	21	0.6	37	0.6	52	0.6	54	0.6	68	0.5	25	0.6	39

Key:

vel. = velocity, dis. = discharge



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Inlet capacity

The capacity of each inlet, maximised when first laid, can be affected by future re-surfacing which may raise carriageway levels above the normal 125 mm kerb-face. If so, capacity can be protected by cutting back the surfacing adjacent to each inlet (special tool available).

Outlet capacity

In practice, capacity requirements can vary according to location of the outlet and the depth of flow within the system. For design purposes, an outlet capacity of 62 litres per second should be adopted. If this capacity is insufficient, more than one outlet unit should be installed to discharge into the outfall chamber.

Outfall chamber/pipe capacity

Outfall discharge capacity should be as large as possible to ensure benefits from Highway system. In large schemes, gully pots used as outfall chambers may be insufficient because turbulence can reduce capacity levels below that which a standard 150 mm outfall pipe can sustain. Where possible, purpose-built chambers (brick or precast manhole rings) are recommended instead to help minimise effects of turbulence on capacity. The appropriate outfall pipe can then be selected to suit the specific case (see table).

Linear grates

Highway can be used for long runs of linear drainage where high volumes of surface water drainage is required or high wheel loads are imposed.

Highway outfall pipe capacity

Gradient	Pipe diameter (mm)				
	150	225	300	375	450
1:20 (5%)	42	122	260	468	736
1:40 (2.50%)	29	86	183	330	534
1:60 (1.67%)	24	70	149	268	436
1:80 (1.25%)	20	60	129	233	376
1:100 (1.00%)	19	54	116	208	337

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Sustainability and local sourcing

Energy use: Aggregate Industries is at the forefront of sustainability and has committed to reduce carbon emissions by 20% by 2016 based on a 2012 base line.

Recyclable: 100% of the product can be recycled thus reducing the amount of material that is sent to landfill.

Manufacturing location: Produced in the UK, with locally sourced materials under strict environmental and social legislation, for local supply.

Responsible sourcing: Aggregate Industries is the first company in the world to achieve a BES 6001:2008 Responsible Sourcing Certificate from BRE Global. Products are assessed on:

- quality management
- environmental management
- health and safety management
- greenhouse gas emissions
- minimising raw material usage
- labour practice
- biodiversity
- community engagement.

Key aggregate and recycled content

Highway is manufactured using high quality granites and quartzite.

Generic green guide rating*

Not applicable.

Policies

Aggregate Industries policies on the Environment & Community, Health & Safety and Sustainable Solutions for different product applications can be viewed on our website www.aggregate.com

Installation standard

Install in accordance with Aggregate Industries recommendations. For specific guidance refer to www.aggregate.com or call the technical helpline on 01335 372222.

Maintenance and cleaning

Aggregate Industries can supply on request advice on specific stain removal and general maintenance, suitable cleaning products, referrals to specialist cleaning companies etc.

COSHH data

Full COSHH data on the Charcon range of products is available on request. Please call the technical helpline on 01335 372222.

Technical support

Detailed guidance and assistance with the preparation of specification of the Charcon range of hard landscaping products, including model clauses, is available through the sales office. A free technical design service is also available.

For further information, please refer to our technical services on 01335 372222.

*Ratings based upon generic green guide values (2009) supplied by BRE Global Ltd, www.thegreenguide.co.uk

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