



Ironmaster®

Robust manhole and highway ironwork reconstruction with 5 years peace of mind... **Guaranteed.**

“The previous system we used kept cracking. We chose (Ironmaster™) because of the five year warranty and we’ve had no problems at all with the repairs we’ve had done.”

SENIOR SUPERVISOR, TfL Region, LONDON



THE PROBLEM – structural

Until now there has been no reliable, long-term treatment for failures around manholes and highway ironwork. Conventional repair techniques have not provided a sustainable solution, leading to frequent repairs (sometimes after just 12-18 months) in order to maintain a safe and level running surface.

In addition, traditional repair methods utilise vibrating rollers and heavy compaction equipment which themselves cause further damage to the substrate and the rigid materials used to support the structure, undermining the repair and hastening re-emergence of defects.

These problems have been exacerbated by heavier HGV's and subsequently compounded by the use of super single tyres, increasing loads on road pavements by 4 times that of traditional goods vehicles.

THE PROBLEM – financial

With a calculated average cost for an emergency repair and reinstatement of £1,200* and the average life of a manhole surround on a heavily trafficked route at 2.5 years, the annual maintenance cost per manhole equates to £480*. The use of Ironmaster could represent an annual cost saving of up to 70%.

These figures do not include the hidden costs which are acknowledged but seldom calculated, such as the true cost of disruption to the travelling public and commerce.

Over £200 million is spent annually in the UK on installing and reinstating damaged & defective highway ironwork. That's £½ million each day.

THE PROBLEM – litigation

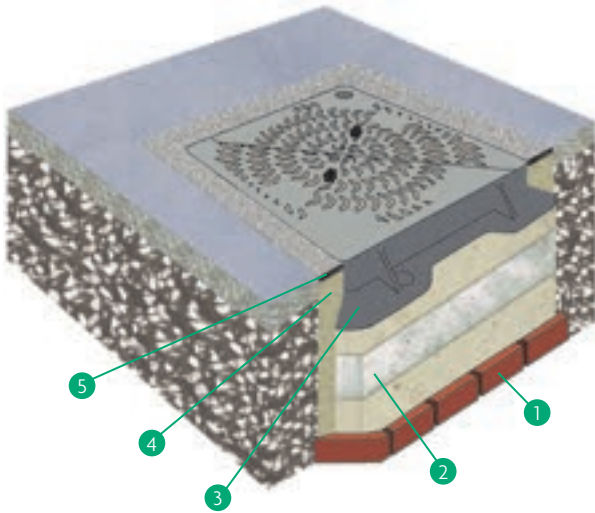
Claims against councils, for damage to both road users and their vehicles (caused by deteriorating roads) have escalated dramatically in the past few years and in many cases the highway maintenance budget has been used to settle these compensation claims.

CAUSES OF FAILURE & SOLUTIONS

FAILURE MODE	THE CAUSE	THE SOLUTION
COMPACTION	Insufficient compaction can allow the surrounding surface to rut under traffic. This results in HGV's and other vehicles 'striking' the iron cover and disrupting the bond.	The Ironmaster® system incorporates a proprietary material which does not require compaction to achieve the required rut resistance. This eliminates the risk of failure caused by insufficient compaction.
	Compacting too close to the iron cover can result in the compaction equipment striking the cover and shattering the mortars before they have even attained their required strength.	The proprietary materials incorporated in the Ironmaster® system eliminate the need for compaction equipment - a major cause of damage to pre-cured mortars.
MATERIALS	Disparity between the thermal expansion rates of the iron frame and the surrounding road pavement can disrupt the bond between the two and lead to failure.	The flexible materials used in the Ironmaster® system allow differentials in movement to be accommodated.
	Fatigue cracking as the road pavement deflects under traffic.	The Ironmaster® system incorporates products which are resistant to cracking and absorb deflection movements.
	Use of non-standard or insufficient materials unable to stand up to the requirements of the location.	The quality system incorporated into Ironmaster® ensures that only pre-approved and tested materials are used. This underpins the five year guarantee.
WORKMANSHIP	Inadequate attention to detail.	The Ironmaster® system is only installed by fully trained and certified crews. The teams are rigorously trained and refresher courses, tailored to each teams and/or customers specific requirements, ensure that knowledge levels are maintained and new team members are trained to Rhino's exacting standards.
	Installing re-instatements on top of a damaged substrate.	The Ironmaster® system requires excavation down to the engineering brickwork and lower if there is still evidence of damage. Excavation continues until a stable foundation is reached, a key element of its success.

*Optimising ironwork whole life cost using performance testing by Scott Wilson Pavement Engineering

THE FINISHED IRONMASTER® INSTALLATION



THE UNIQUE IRONMASTER® INSTALLATION PROCESS

- 1 Break out & excavate the existing structure down to the engineering brickwork, removing the ironwork to expose the chamber.
- 2 After thorough cleaning, install pre-cast purpose made concrete shim for consistent load bearing, bedded in high quality fast setting IM Mortar P or C.
- 3 The ironwork is bedded onto the mortar with attention to ensuring accurate levels.
- 4 Back fill the remaining void with fast setting IM Infill Mortar.
- 5 Screed the topping layer with IM Patch (flexible, non-compacting wearing course) and apply skid resistant aggregate finish.

VERSATILE & ADAPTABLE SYSTEM

Highly suited to:

- stopcocks
- fire hydrants
- gullies (single & double)
- manholes (single, double & triple).

Easily accommodates non-standard sizes, unforeseen structural conditions and localised surface deterioration.



COMPLETED IRONMASTER INSTALLATIONS AT A BUSY INTERSECTION

IRONMASTER MORTAR P (POLYESTER RESIN) OR MORTAR C (LIQUID POLYMER)

Use: Bedding of pre-cast concrete shims and ironwork frame

Thickness: Minimum: 5mm Maximum: 50mm

Strength:	Compressive Strength N/mm ²	Tensile Strength N/mm ²
Mortar P at 1 hour	61.5	8.2
Mortar P at 2 hours	70.0	8.3
Mortar P at 28 days	85.0	9.9
Mortar C at 1 hour	30.0	3.3
Mortar C at 3 hours	53.0	6.1
Mortar C at 28 days	78.0	7.1

tested at 20°C curing temperature

IRONMASTER REINFORCED CONCRETE SHIMS

Use: a) even distribution of weight transference through the structure

b) to supplement where Mortar P or C depths exceed 50mm

Compressive Strength:	>50 N/mm ²	Shim width:	100 mm
Shim thicknesses:	30 mm or 50 mm	Reinforcing:	6mm steel

IRONMASTER INFILL MORTAR

Use: Backfilling the excavation around the ironwork

Thickness: Minimum: 20mm Maximum: 200mm

Compressive Strength:	N/mm ²	Compressive Strength:	N/mm ²
at 90 mins	20	at 24 hours	35
at 2 hours	25	at 7 days	50
tested at 20°C curing temperature		at 28 days	60

IRONMASTER PATCH

Use: Unique asphalt topping layer/wearing course, dressed with a 3mm high PSV aggregate

Rutting: (tested at 50°C)	Wheel tracking rate	6.3 mm/hr
	Rut depth	10.3 mm

Friction properties:	Skid Resistance Value (SRV)	Texture depth (mm)
before wheel tracking	99	1.5
after wheel tracking	88	1.0

Nominal thickness: 30 mm

Application temperature: 170°C to 200°C

A LONG TERM SOLUTION

Ironmaster® is a full depth repair system which does not require the use of vibrating rollers or heavy compaction equipment. The combination of a unique shock absorbing and self-compacting surface course, a rapid cure process and joint free repair system results in a repair which can be trafficked within 60 minutes of installation, but is durable enough to last in excess of 60 months.

It is suitable for all types of ironwork typically encountered, including 100mm & 150mm ironwork as well as all surface mounted utility covers.

QUALITY CONTROL

A key element of the Ironmaster® proposition is a quality installation. To ensure the repair lasts at least five years, Rhino focuses on training and certifying all operatives responsible for the installation of the repair - whether they are your own contractors or the in-house Rhino teams. The initial training programme is sustained by refresher courses, tailored to meet the specific requirements of the organisation and/or team.



Ironmaster® is a BBA HAPAS approved proprietary reconstruction and stabilisation system for manholes and highway ironwork. It offers a five-year guarantee which can generate savings of up to 70% on annual maintenance costs.



BEFORE



AFTER

RESULTS OF A STUDY IDENTIFYING CAUSES OF HIGHWAY IRONWORK FAILURES ON 1,500 SEPARATE UNITS

FAILURE MODE	NUMBER OF UNITS DEMONSTRATING FAILURE TYPE	PERCENTAGE OF TOTAL UNITS DEMONSTRATING FAILURE TYPE
Cover and/or frame	500	33%
Bedding Mortars	1500	100%
Packing Materials	195	13%
Brickwork support 1st course	1250	83%
Brickwork support 2nd course	475	32%
Road surface surround	1460	97%

The rhino challenge

Challenge us to repair your most persistent offending gully/manhole and see exactly why Ironmaster® comes with the industry unique 5 year guarantee.



IRONMASTER® ON ONE OF LONDON'S BUSY RED ROUTES

"We have had real problems in the past with road repair systems failing after relatively short periods of time and knew that something more robust was needed for major traffic routes."

"The results of our study highlighted the fact that Ironmaster was the most suitable system for these roads and the five year warranty will not only save us money in the long run, but will reduce disruption caused by the need to reinstate failed repairs."

Glasgow City Council
Land Services Directorate



IRONMASTER® – the facts

- **5 Year Guarantee:**
Unique to Rhino.
- **BBA HAPAS approved:**
Ironmaster® has BBA HAPAS approval for the durable reinstatement of manholes and highway ironwork.
- **No repeat repairs:**
No recurrent problems.
- **Unequaled:**
In an independent test, Ironmaster® performed the best out of six repair systems tested and was the only one to achieve:
 - zero settlement of manhole covers
 - zero surface cracking
 - zero degradation
- **Safety:**
The skid resistant finish and the fact that the repair is level with the surrounding surface minimises any risk to pedestrians, cyclists, motorcycles and vehicles.
- **Disruption - Minimal:**
With a thorough installation, short curing times and at least five maintenance free years, disruption to all road users is minimised.
- **Installation Options:**
Can be installed by our skilled crews or your own trained operatives.

OUR PROMISE

Our senior management team has over 100 combined years experience of the highways repair and maintenance market, so we know the industry's 'best', as well as its 'worst' practices. When we set up Rhino, we were adamant that we would build a business based on:

- Excellent customer service
- Providing a highly responsive service
- Being flexible to meet customers' specific requirements.

Therefore, when you deal with Rhino, you are guaranteed that there are no hidden extras. The price we quote includes:

- All materials, labour and plant necessary to complete the work.
- A unique reference to identify each installed Ironmaster®.
- A site inspection - to assess the damage prior to quotation.
- A programme which specifies timescales required to complete the works - **and we keep to it.**
- A clear, unambiguous, firm quotation which we honour.
- A five year guarantee certificate for Ironmaster® installations.

In addition, we can also offer the following if required:

- Full traffic management.
- Provision of new covers and frames.
- Product-only sale for self-installation.
- Supervision, support and training for crews.

Our pledge to you is that we will always provide you with a highly responsive and flexible service, use the best material for the job and never over promise and under deliver.

Steve Loader

Director

