

Cracking Matters



THE JOURNAL OF THE CONCRETE REPAIR ASSOCIATION

ISSUE NO. 29

CRA calls for compulsory inspections of car parks



The Concrete Repair Association is supporting a call from the British Parking Association (BPA) for the introduction of a compulsory inspection regime for the UK's concrete multi-storey car parks.

The plight of the UK's aging multi-storey car park stock was recently highlighted by the BPA, which found that many of the UK's concrete multi-storey car parks, built in the 1960s and 1970s, had fallen into disrepair. Many are showing significant signs of deterioration and some could even be in danger of structural failure.

Although car park structures are expected to undertake similar duties and withstand similar exposures to bridge structures, they are designed to a less rigorous design code and, unlike bridges, are not subject to a fully-documented inspection regime, laid down in legislation.

While the CRA recognises that there are owners/operators who take their responsibility seriously and spend considerable amounts of money taking care of their car park assets, there does not appear to be any formal regime in the form of a voluntary code of inspection. And, although guidance is available from the Institution of Civil Engineers (ICE) document, *Recommendations for the Inspection, Maintenance and Management of Car Park Structures*, it is unclear how many owner/operators have taken on board its recommendations or are even aware of it.

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UK CONCRETE SHOW ON THE MOVE

The Concrete Repair Association (CRA) will once again be supporting the UK Concrete Show, which is moving to Hall 7 of Birmingham's NEC for 2013.

The event, which takes place on 27-28 February 2013, promises to be bigger and better than ever before. With 8000m² of indoor space and up to 2750m² of outside space available, it boasts 80% more space than in 2012.

The Show brings the industry together, under one roof and should be of interest to anyone involved in the concrete industry, including producers, specifiers, specialist contractors, engineers and architects.

As before, the exhibition will feature live product demonstrations, while a supporting seminar programme will discuss technical matters and industry issues, as well as the latest developments in the industry.

New features for this year include an iPhone and Android Show App with Online Event Planner to help visitors plan their day. Meanwhile, improved catering and free parking is offered for visitors and exhibitors alike.

For further information, or to book your space visit www.concreteshow.co.uk; or contact Stephen Liverman; email: sgl@concreteshow.co.uk; tel: 020 3086 9296 ext.4. **And remember, CRA members are being offered a 10% discount on bookings.**

The UK CONCRETE Show
February 27 & 28, 2013 The NEC, Birmingham

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CRA calls for compulsory inspections of car parks



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The problem

Deterioration in concrete car parks is caused, in the main, by chloride based de-icing salts being used in the car park or brought into the structure on vehicle tyres. These chloride salts allow corrosion of the embedded reinforcing steel and, ultimately, significant spalling of the concrete.



Corrosion of reinforcing steel results in the loss of steel cross-section, which may significantly restrict load-bearing capability and may lead to punching shear issues in the area of the columns.

The corrosion problem can sometimes be exacerbated by owners who apply a car decking system to eliminate water from the concrete in an attempt to overcome such issues and limit further corrosion. Where corrosion rates and chloride levels are well advanced, corrosion may continue beneath such coatings, remaining hidden until the point of spalling, or even worse.

Other issues in these ageing structures can be associated with the form of construction. For example, where precast items are used, movement of the structure may reduce the adequate bearing surfaces. This could potentially lead to failure over time and the need for remedial measures, such as the application of purpose-made metal brackets, designed to pick up the required load, should a failure occur during service.



Concrete repair techniques

To address punching shear issues and wide-spread corrosion of the reinforcing steel, work must be conducted to increase the size of column heads; or remove the concrete to expose the corroded steel and enable its replacement. Concrete removal may be carried out using the latest concrete cutting techniques, such as very-high-pressure hydro-demolition, or conventionally using hand held breakers.



Breaking out of concrete will continue chasing along the steel reinforcing until a point is located where the cross-sectional area is structurally acceptable. In the case of a waffle slab, this may simply leave a lattice of the ribs, with whole areas of the slab having been removed. In order to replace this concrete homogeneously, it is necessary to have waffle moulds to replicate the original dimensions. New versions will have to be created, if the original construction moulds are no longer available.



Work to column heads may involve using pre-bagged fluid flow materials to increase column head dimensions. This requires a very exact regime to ensure that the load from the slab is correctly 'picked up', through the precise location of new reinforcement and attention to detail in the production of the necessary formwork.

Use of a proprietary fluid-flow concrete, containing various additives including expansive agents, will ensure that the

load is 'connected' with the material being introduced into the watertight formwork. Holes accurately cored down through the deck from above allow both the introduction of the material and the venting of any air from the shutter as the concrete is injected.

Once work is completed, the application of a waterproof/wearing surface to all car park deck surfaces will offer long term protection to the structural integrity of the deck slab and protect the embedded reinforcing steel from the aggressive chloride ion solution. Reference should be made to the European Liquid Waterproofing Association, *Specification and use of Liquid Applied Car Park Deck Systems*.

To ensure the continued structural integrity of the UK's car park structures, a more rigid regime of inspection and maintenance is essential. Furthermore, it must be ensured that all inspections and repair works are conducted by competent personnel who have a full understanding of the deterioration mechanisms associated with car park structures and how these may be adequately arrested to ensure a continued service life.

For further information on concrete inspection and repair techniques and for a list of specialist contractors, visit the CRA website, www.cra.org.uk

NEW LOOK FOR CRA WEBSITE

The UK Concrete Repair Association (CRA) has updated its website to improve navigation and ensure ease of use for visitors.

Providing extensive information on this specialist area of construction, the CRA website, www.cra.org.uk, offers a simple menu structure to ensure that visitors can find exactly what they need within moments of entering the site.

The Association's popular range of advice notes on repair, structural strengthening and electrochemical rehabilitation techniques can be downloaded straight from the Publications section of the site, while trailers and information on the CRA's CPD Presentation programmes can be viewed on the Training pages.

CRA news announcements are regularly posted to the site, while copies of Cracking Matters – the CRA's – bi-annual newsletter – and its quarterly E-Bulletins can also be viewed. Interested individuals can also sign up to receive the E-Bulletin, to ensure they are kept up-to-date with CRA member company projects and product innovations.

The website also provides access to up-to-date information on performance and quality standards, health & safety matters, CRA codes of practice and training initiatives and full details of membership benefits and requirements.

Visitors wishing to form a project tender list, will find the site's member search facility an extremely useful tool. This enables CRA members operating in a particular specialism or geographical area to be identified, so that visitors can match their search to their particular requirements.

Full contact details for each member are also provided, along with interesting case studies and a list of the services they offer.

Providing simple and direct access to concrete repair professionals, the CRA website, www.cra.org.uk, should be top of the list of places to visit for anyone responsible for specifying, setting up or controlling concrete repair projects.

Running rings round the Olympics

Allen's observations

A few weeks ago, before the Olympics began, I received three emails in quick succession.

The first from a local authority asking what procedures the company had in place to mitigate the Millennium Bug. The second, asking us to replace the words "Millennium Bug" with "London Olympics" – further evidence if needed of the continuing impact of austerity, when Councils are dusting off old emails rather than write new ones. Finally, came a missive from Les, who works for a paint supplier, informing us that during the Olympics we would still be able to make collections from their Coventry depot.

As we are based on the outskirts of South East London this seemed a long way to go for a tin of paint! I phoned Les, who has been on mutual bantering terms with me for many years, to ask whether he would be providing accommodation free of charge should we take up his offer.

His reply, suitably adjusted to the tender sensibilities of Cracking Matters readership was that: "he was well (deleted) aware of how far (deleted) London was from (deleted) Coventry, but the (deleted) management insisted that he inform every single (deleted) customer, including those sarcastic (deleted) in Scotland. What's more 'they' – the (deleted) management – were emailing him

every (deleted) half hour to see if he had done it yet."

Sometimes you just have to let people get it off their chest!

Two days later, I had a follow up from the Council in question reminding me that I had not responded to their email. Time, I was assured, was of the essence. They included one of those little countdown clock gizmos so that I could see the seconds slip away before the opening ceremony and certain Armageddon, should a medium-sized contractor fail to be prepared to deal with its responsibilities.

So let me pass on these words of comfort for anyone who is similarly concerned about the potential doomsday scenario.

Firstly, if the army needs to shoot down an airliner from the roof of Fred Wigg House in Bow, they will find said roof in tip top order for missile launching, since it still has eight years of its guarantee left to run from when I repaired it in 2000.

Secondly, as we only do planned works, we have spent the last six years planning not to do any around the Olympic site region during the Olympics.



Finally, our policy for this period will be the same as always – to "Keep Calm and Carry On". To prove it you will be able to find lots of marketing material (cups, pens, posters etc) at reasonable rates at all good retailers, some dodgy market stalls and the odd boot sale. This will be in contrast to some of the

tat that is going for double its usual inflated price due to it having five rings printed on it somewhere.

If that's not enough for the bureaucrats of doom then I join with Les in telling them – they can all get (deleted)!

INDUSTRY Developments

CRL CONTRIBUTES TO NEW FRP REPORT

CRL has completed its work on the Steering Group for the update of the Concrete Society Report TR55, *Design Guidance for Reinforced Concrete Strengthening using FRP Materials*. This industry standard, now in its 3rd Edition, covers changes brought about by the introduction of Eurocode 2, as well as additional university research and material changes.

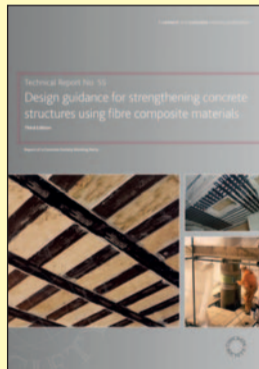
CRL has worked on the Steering Group for all three editions, with the first publication released in 2000. The company continues to support university research into fibre-reinforced polymer (FRP) materials to enable it to continue to provide value engineered FRP strengthening solutions.

In 1996, CRL was the first UK company to complete a commercial FRP strengthening scheme and it continues to lead the industry in this specialist sector.

Over the next six months, CRL will be delivering CPD presentations across the UK describing the new TR55 publication.

For further information please contact:

E-MAIL: JDrewett@concrete-repairs.co.uk WEBSITE: www.concrete-repairs.co.uk



NEW LONDON OFFICE FOR PRESTEC

Midlands-based Prestec UK Ltd has opened a new southern divisional office in Wanstead, London to service enquiries in London and the south of England. The office is headed up by Tom Bugg and Jane West, who have joined Prestec UK to run this new division.

Previously directors of Quickseal Specialist Contractors, Tom and Jane ran the company for 26 years until its acquisition by Volkerlaser. They remained with the company for two further years.

"We are both very excited by the prospects for Prestec UK in the south and are looking forward to working again with Pat Quarton who was with us for many years at Quickseal. We shall be pursuing work in our usual sectors of concrete repair, structural waterproofing, strengthening and restoration, along with Prestec UK's interests in the car park and dilapidations markets" said Tom.

The new office can be contacted at: Prestec UK Ltd (South), 53a High Street, Wanstead, London E11 2AB; tel: 0208 530 6808. Tom's mobile number is 07867 396253 and his email is tom.bugg@prestecuk.com



CURRENT CRA MEMBERS

Contractors:	Telephone:
AMBER CONSTRUCTION SERVICES LTD	020 8592 5699
APA CONCRETE REPAIRS LTD	01422 379640
ALFRED BAGNALL & SONS (RESTORATION) LTD	020 8311 3910
BALVAC LTD	01606 333036
CEMPAS WATERPROOFING & CONCRETE REPAIRS LTD	020 8654 3149
CONCRETE REPAIRS LIMITED	020 8288 4848
CONCRETE RESTORATION LTD	020 8994 8860
CURRALL LEWIS AND MARTIN (CONSTRUCTION) LIMITED	0121 522 9292
FREYSSINET LTD	01952 201901
GUNITE (EASTERN) LTD	01480 466880
JB SPECIALIST REFURBISHMENTS LTD	01487 834017
MACKENZIE CONSTRUCTION LTD	0141 633 5555
MAKERS CONSTRUCTION LTD	0845 899 4444
MANSELL CONCRETE REPAIR	01977 520070
MATRIX SOLUTIONS UK LTD	01454 616170
PRESTEC UK LTD	0121 308 8001
RENOCON LTD	020 7538 5492
REPEX LTD	01435 866666
RSS CONSTRUCTION PROJECTS LTD	0845 612 3293
SEALABILITY LTD	0870 405 0001
SONNY MAINTENANCE LTD - SMG	01323 411298
SOUTH WEST CONCRETE REPAIRS LTD	01752 561300
UNIVERSAL SEALANTS (UK) LTD	0191 416 1530
VOLKERLASER LTD	0844 800 4560

Manufacturers:	Telephone:
FOSROC LTD	01827 262222
PAREX LTD	01827 711755
REMMERS (UK) LTD	0845 373 0103
SIKA LTD	01707 394444
WEBER	01525 718877

Distributors:	Telephone:
EPMS SUPPLIES	01132 760037
RESAPOL LTD	01942 609001
SIG CONSTRUCTION ACCESSORIES	0845 863 0819

Associates:	Telephone:
BIRMINGHAM CITY LABORATORY	0121 303 9300
THE CONCRETE CONSULTANCY 2000 LTD	01707 268034
MARTECH TECHNICAL SERVICES LTD	01487 832288

CEMPLAS AND RESAPOL CREATE NEW WATERPROOFING DISPLAY



Structural waterproofing specialist **Cemplas Waterproofing and Concrete Repairs** recently worked with distributor **Resapol** to create a permanent display area of specialist waterproofing products at Resapol's Park Royal depot.

Resapol supplied samples of RIW, Sika, Grace, Fosroc and De-Neef waterproofing and cavity membrane systems to Cemplas specialist waterproofing operatives, who applied and installed the products to display the various stages of installation.

The new display, which was completed in two days, includes literature from Cemplas to highlight the use of the products in completed waterproofing projects, giving Resapol customers a visual interpretation of how the products can be used.

Paul Stacey, Business Development Director of Cemplas, said that the company was pleased to have been instrumental in developing the new look display area. Meanwhile, Matthew Baker, Southern Regional Director of Resapol, said he was delighted with the finished work by Cemplas, which is one of their major accounts. He added that the visual aspect of actually seeing the products in situ would greatly benefit Resapol customers.

Structural waterproofing specialist Cemplas provides an unrivalled range of design and implementation services. The company has a dedicated, well equipped and well trained workforce, which offers design support, guidance and advice as a major part of the service it provides. Its experience in waterproofing assisted in the design of the industry's first NVQ in structural waterproofing, which comprises practical work, as well as written papers.

CEMPLAS WATERPROOFING & CONCRETE REPAIRS LTD
020 8654 3149
www.cemplas.co.uk

BCL INVESTS IN CORROSION ANALYSIS EQUIPMENT



Birmingham City Laboratories (BCL) has recently invested in new test equipment to undertake 12,000m² of half-cell potential mapping of a large multi-storey car park.

The Canin+ Corrosion Analysing Instrument, developed by Proceq enables rapid, comprehensive testing of a structure and provides fast on-site assessment of locations where corrosion is likely to take place.

The use of the Canin+ device enabled the car park to be surveyed accurately and quickly, causing minimal disruption to car park users and no loss of car park revenue.

The device offers accurate half-cell potential measurements to aid in detecting sites of corroding reinforcement. Corrosion of steel in concrete is an electrochemical process and potential fields can be measured on the concrete surface by the use of an electrode, known as a half-cell, and a high-impedance voltmeter.

BCL's Building Investigation team has gained extensive knowledge in surveying and testing a wide range of reinforced concrete structures; including high-rise structures, bridges and car parks. Understanding the design, material characteristics and corrosion processes affecting a particular reinforced concrete building or structure is essential in diagnosing the cause and extent of deterioration, thus enabling a suitable repair strategy to be formulated.

BIRMINGHAM CITY LABORATORIES
0121 303 9300
www.bcl-testing.co.uk

FREYSSINET STRENGTHENS HAMMERSMITH FLYOVER



The Hammersmith Flyover, an elevated roadway in west London which carries the A4 dual carriageway, was closed just before Christmas 2011 after inspections revealed a significant corrosion problem with the existing post-tensioning installed in the early 1960s.

Although it was re-opened with reduced load limits and lane closures in early January, the target was to re-open to full traffic prior to the 2012 London Olympic Games.

Freyssinet was appointed by Amey to assist with the design phase. Several options were considered but the solution adopted was to install additional post-tensioning (PT) tendons above and below the top slab within a new widened central reserve.

Freyssinet was awarded the contract, valued at approximately £4 million, and commenced work in late January 2012. Freyssinet's C-Range 'System 2' pre-stressing system was used as it is durable, replaceable and adjustable (re-stressable).

Around 200m of the existing concrete central reservation was removed using hydrodemolition and wall sawing techniques and a survey of the existing reinforcement in the deck completed. An additional top slab was cast in the central reserve.

Freyssinet carried out coring for the installation and stressing of vertical PT 'Freyssibars'. New PT concrete blisters were cast above and below the top slab. Freyssinet 9C15 horizontal tendons were then installed and stressed, un-bonded in pre-grouted HDPE (High Density Polyethylene) ducts. After stressing operations were complete, the Freyssibar ends were finished, capped and treated with corrosion protection.

Using specially developed formwork and PT support systems, the works were completed in early May 2012, well ahead of schedule.

FREYSSINET LTD
01952 201901
www.freyssinet.co.uk

MATRIX REFURBISHES HERTFORD CAR PARK



CRA member **Matrix Solutions** has recently carried out a major refurbishment of Bircherley Green Shopping Centre car park in Hertford.

The 1980s cast in situ reinforced structure provides 182 spaces, with the key anchor store, Waitrose, utilising a large proportion of the car park.

Over time, the unprotected decks had begun to deteriorate via a combination of water and salt ingress, the extent of which was exacerbated by low cover to the steel. This had also led to spalling of the soffit units directly beneath cracks and day joints, leaving sections of exposed reinforcement and loose concrete.

In conjunction with fellow CRA member, Sika Limited, wide-scale concrete repairs were carried out, with the addition of sacrificial anodes to protect against future incipient anode reactions. The decks were prepared and protected using the fast cure Sikafloor Pronto system, allowing the car park to remain open throughout the project.

MATRIX SOLUTIONS UK LIMITED
01454 616170
www.matrix.uk.com

SAINT-GOBAIN WEBER REPAIRS M1 VIADUCT



CRA manufacturer member **Saint-Gobain Weber** supplied innovative spray concrete repair products for the permanent remedial repair of the Deansbrook Viaduct.

The viaduct, which carries the six-lane M1 motorway at Mill Hill, London, was badly damaged in April 2011 when fire broke out in a scrap yard beneath it. Extensive investigation, assessment and temporary structural reinforcement was undertaken to restore it as quickly as possible.

The viaduct was constructed with reinforced precast concrete beams 1m wide x 20m long. When subjected to the severe heat, the soffits of the concrete beams spalled and delaminated, while the silica aggregate underwent a crystalline transformation and expanded in volume. The resultant concrete surface became very weak up to the depth where the heat reached around 600°C. A thick layer of soot covered the soffits and, in the process of high pressure water jetting, these weak layers fell away.

Concrete repairs, parapet and bearing replacement, and new bridge joints were required to ensure the continued safety of the structure.

The gaps that formed between the beams were filled with **weber.cem spray DS**, a polymer-modified, dry-spray, structural cement-based concrete ideally suited for the repair of fire damaged concrete structures. Some 4,000 25kg bags of **weber.cem spray DS** were used during the 16-week programme, while a further 1,200 25kg bags of **weber.cem spray RS**, the rapid setting equivalent, were used where a more rapid strength development was required.

Temporary bearing props were installed using **weber.tec EP mortar**, a high-strength epoxy resin mortar for repairs, bedding and fixing.

SAINT-GOBAIN WEBER
08703 330070
www.netweber.co.uk

CRL AWARDED GUERNSEY JETTY CONTRACT



CRL has been awarded a £3.53m contract by the States of Guernsey to undertake significant repairs, install an impressed current cathodic protection (CP) system and refurbish the fenders to Berths 4 and 6 of St Peter Port Harbour in Guernsey.

The contract is due to commence on site in April 2013 and scheduled for completion in 18 months. CRL is currently finalising the CP design and repair sequence with the client's consultant, Halcrow (a CH2M Hill company), to ensure that the project is value engineered before work commences.

Marine structures often deteriorate due to corrosion of the steel sheet piling, steel piles and steel reinforcement and cathodic protection is recognised as the primary technique to stop corrosion and enhance durability. CRL have been designing and installing CP systems in the UK and the Gulf Region since 1989.

For further advice on marine structural repairs contact:

CONCRETE REPAIRS LTD
020 8288 4848
jdrewett@concrete-repairs.co.uk

MARTECH GOES UP IN THE WORLD



Abseiling engineers from CRA member **Martech Technical Services** have just completed the final inspection of one of the world's tallest hospitals.

Ten years ago Martech carried out a full and thorough external survey of the tall building, inspecting and testing the reinforced concrete for signs of ageing and to catalogue any potential areas of deterioration.

Since then Martech engineers have revisited the building annually to carry out safety inspections and provide updated information on the condition of the reinforced concrete facades. This enables property maintenance staff to plan their renovation and future design budgets.

MARTECH TECHNICAL SERVICES
01487 832288
www.consultrve.co.uk

PRESTEC TRANSFORMS PARKHILL



CRA member **Prestec UK Limited** recently delivered a concrete repair package at Parkhill, a Grade II listed building in Sheffield which is the largest listed structure in Europe.

Built in the 1950s and opened in 1961 to replace slum terrace property, Parkhill was designed by architects Jack Lynn and Ivor Smith, to provide three types of apartment to suit all family types, from single pensioners to families of six or more. Unfortunately, by the 1980s Parkhill had become dilapidated.

Commencing work in May 2009, Prestec initially conducted concrete repairs and provided specialised coatings to the façade of the building. The company also carried out repair works to the helical stairs and lift shaft beams, fabrication works and brick cleaning. In 2011, Prestec carried out internal repairs and provided wall sealer coatings.

Works undertaken included cover meter/hammer test survey of building

frame and blast cleaning to all concrete surfaces; hydro-demolition to defective concrete; anti-corrosion coatings to reinforcement; concrete repairs both internally and externally; and the application of specialised coloured coatings.

Structural repairs and alterations were conducted on the main architectural elements of the cut and core, the scenic glazed lift apertures and the aperture for the scenic spiral staircase.

Completed in December 2011, the works were carried out to the highest standards by the company's skilled concrete repair operatives, under the ever watchful eye of English Heritage.

Prestec was appointed by developers Urban Splash following successful projects at Fort Dunlop and the Rotunda in Birmingham.

PRESTEC UK LTD
0121 308 8001
www.prestecuk.com

WHAT DO YOU THINK OF CRACKING MATTERS?

The Concrete Repair Association is always keen to gather feedback on its activities, and this month would like to focus on its journal, **Cracking Matters**.

Cracking Matters carries information on Association activities plus comment articles from external organisations. The journal, now in its 14th year, is published twice a year and mailed to interested companies and individuals. Alternatively it can be downloaded from the CRA website, where back issues are also available.

But what do you think of it? Do you read it? Would you like to see it continue in print format, or would you prefer to receive it electronically? Which parts do you enjoy the most? Have you placed a contract based on information you have seen in **Cracking Matters**?

Please let us know what you think by completing the survey on www.cra.org.uk

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