



Capability Statement: Cathodic Protection of Heritage Structures

C-Probe Systems Limited is at the forefront of the development of solutions to protect our heritage buildings from corrosion. Since 1998 we have successfully designed, implemented and managed many buildings on behalf of private owners, pension funds, Banks and other asset holders.

Corrosion grows over time causing unsightly cracking and movement of masonry that in some extreme instances has resulted in collapse of sections of the building. The problem is becoming prevalent as these landmarks and listed buildings become older. Corrosion takes time to build-up due to the ingress of moisture being trapped within the mason’s mortar infill that was characteristic of this construction between 1900 to 1950. For many years the problem is hidden and only manifests itself when sufficient tensile forces build-up from the growth of the corrosion products to push against the masonry envelope.

The problems for the owner also build up with health & safety issues, maintaining lease agreements with tenants and general saleability and value amongst the main concerns.



The project development phases are:

- Survey the condition to assess the extent of the underlying problem.
- Monitor the ongoing condition with AchillesEDC.
- Traditionally repair where necessary.
- Install an impressed current cathodic protection (ICCP) system to control the corrosion with AchillesICP.

C-Probe offers systems designed to reduce the cost of traditional repair that will allow the owner to have comfort that the building in its portfolio will be protected and managed for many years to come.

To quote an industry corrosion expert and the project system designer:

“By preserving the life of historic steel-framed structures, this new material and method of work will ensure that buildings continue to fulfil their functional purpose and re-affirm their place in our local and national cultures. Without this innovative work, structural deterioration will occur and result in major maintenance works, disruptive to occupants and negatively impacting the look and feel of our cities. In addition, the cost of major maintenance or traditional CP applications far outweighs the benefits of preventative measures through this innovative, non-disruptive approach”

Professor Paul Lambert,
Mott MacDonald, 2014.





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Defining the Problem—Surveys and Design

It is not unusual for the first signs of damage to appear before action is taken to contain the corrosion problem. Structural Healthcare Limited provides assessment and system design services that sit alongside the structural and façade engineers’ services to provide cost-effective solutions both with regard to masonry repair requirements and the corrosion management system design.

Many techniques may be adopted to define the issues including:

- Visual assessment of damage
- Limited verification breakouts
- Intrusive (through-hole) half-cell surveys
- Camera borescope visual assessment
- Mass magnetic probe survey to assess location and state of metal components
- Thermography assessment of hidden features, energy losses, retained moisture and previous repairs

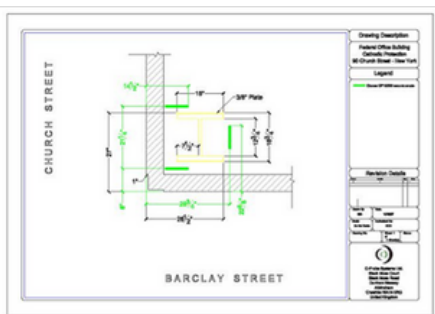


37 Fleet St, London
- Protected in 2007

This information is used to design and define costs for the renovation package including masonry repair costs and their cost-effective integration with impressed current cathodic protection (ICCP) systems in accordance with ISO EN12696:2012.

Usually the placement of anodes allows for 3-dimensional throw of current around the target steel member with a Preview test recommended to verify spacing as well as ability to polarise the steel effectively. This has been achieved with discrete anodes previously and innovated with the C-Probe +point bed joint anode system that dovetails installation with the repointing of the building.

Control zones also provide remote access to performance data from embedded sensors and probes and to remotely control the current and voltage provided to each zone within the property. A running record of performance is provided with C-Probe’s online service live tracking facility.



Designed Anode Spacing



Anode and Wiring Installed Discreetly



Performance monitoring & service life tracking



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Key Projects

- Arkwright House, Manchester, UK
- Kendals Department Store, Manchester, UK
- The Light, Leeds, UK
- Phoenix House, Manchester, UK
- Sunwin House, Stockport, UK
- Dimco Buildings, London, UK
- 157-159 Fenchurch Street, UK
- Mona Chiou Monastery, Greece
- Coupland II Building, Manchester, UK
- Swan House, London UK
- BOK Tower, Lake Wales, FL, USA
- 90 Church Street, New York City, NY, USA
- Terry's Chocolate Factory, York, UK
- 37 Fleet Street, London, UK
- 907 Broadway, New York City, NY, USA
- 85, Fleet Street, London, UK
- Pricebusters Building, Blackpool, UK
- St. Anns House, Manchester, UK
- Liners House, Manchester, UK
- Euston House, London, UK
- Monument Mall, Newcastle, UK
- Horseferry House, London, UK
- Cavendish House, Cheltenham, UK
- Bold Street, Liverpool, UK
- Dinnet Bridge, Aberdeenshire, UK
- Bervie Jubilee Bridge, Aberdeenshire, UK
- 2-4 Church Street, Blackpool, UK
- 51-57 Church Street, Liverpool, UK
- The Commerce Bank, Kansas City, MO, USA
- Victoria Palace Theatre, London
- Dantzig Building, Manchester
- York House, London
- The Helmsley Building, NYC
- Confucius Institute, Glasgow
- Walton Buildings, Liverpool
- Castle Chambers, Liverpool
- Midland Hotel, Manchester
- Panmure Building, Edinburgh



Phoenix House (left) is a thriving office building in the centre of Manchester that has benefited from discrete anode ICCP installed to all elevations to 8 levels in 2003.



85 Fleet Street (left) was built in 1928 and extensively refurbished in 2007 with repair to the Portland stone façade and 28-zones of ICCP to protect the transitional steelframe.



DIMCO Buildings (right) were built in the 1920s as the first inner city power station in Europe. Refurbishment was completed in 2007 with ICCP installed they are now powering the White City shopping complex in London.



Historic Reinforced Concrete Bridges in Aberdeenshire were repaired and beams and half-joints protected in 2005 (Dinnet—above) and 2008 (Bervie Jubilee—below) and are managed in an integrated AiMS site for the County Council.



These heritage building structures have utilised technology to solve their ongoing corrosion issues in a managed manner.

The current components are:

- LoCem® +point bed joint and discrete anode systems
- Embeddable monitoring
- AchillesICP management systems
- Achilles interactive Management Server (AiMS)
- Design & management services



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Industry Awards and Recognition



BOK Tower (above) is an historic 11-level carillon bell tower that hosts offices as well as concerts in stunning garden surroundings in central Florida. The coquina brickwork was renovated and ICCP was installed internally to protect the support beams at each level with a control zone corresponding to each level of the building.



The Commerce Bank (right) on 922 Walnut in Kansas City was built in 1908 and was installed with our +point anode system installed within the stone bed joint as part of a wider refurbishment program. This was also installed at -5C and allowed working through winter.



37 Fleet Street (Hoare's Bank, left) was built in 1829 as the headquarters of C. Hoare & Co who remain the only family owned bank still in existence. The façade was cracking due to iron cramps and pins corroding and was repaired and protected with ICCP in 2006 with all wiring placed externally and hidden within 1mm bed joints.



C-Probe supports and been involved with the drafting of industry standards for all its activities and the use of ICCP and monitoring within transitional steel frame structures is no different.

At ICRI in the USA we were involved with the drafting of the published Guideline for the Evaluation of Masonry Structures and the Guideline for Masonry Repair. We have also been active in Joint Committee of the Institute of Corrosion and The Concrete Society with the development of The Concrete Society technical reports 36,37 and 60 and the ISO EN standards 12696:2012 and EN 1504-9. C-Probe was awarded the QMarque standard in September 2008 and can provide latent defect insurance cover and insurance-backed guarantees for projects in the UK and EC.



C-Probe Awards to Date for Heritage Buildings:

- RISE Awards 2021 - Restoration of Terry's Chocolate Factory, York
- ICRI Sustainability Ward 2015 (The Commerce Bank, Kansas City)
- RISE Award 2015—Category 6 Heritage (Highly Commended)
- Fiotech CETI Award 2015—Innovative Materials and Methods
- Mott MacDonald Milne Award for Innovation 2014
- ICRI Project of the Year 2008—Arkwright House, Manchester
- ICRI Award of Excellence 2007—37 Fleet Street (C Hoare & Co), London
- ICRI Award of Excellence 2007—BOK Tower, Florida

