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Assessment and Inspection of Buildings and other Facilities:

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Abseil from great heights

Tower blocks are a feature of most cities and large town skylines in the UK and when they were built they were seen by many as a necessary solution to the post war housing shortage.Their methods of construction mostly involved using reinforced concrete either for the frame, the cladding or the whole building.

Martech have built their reputation over the past twenty years on their specialist knowledge and use of abseil access to high rise buildings of all types, heights and methods of construction. There is hardly a month goes by without Martech engineers descending on ropes down the elevations of a high rise building somewhere in the country.

As an example **Martech** were commissioned by consulting engineers to carry out phased safety works and a concrete and brickwork condition survey on three high rise blocks of flats located in East London.

Using abseil access **Martech** engineers surveyed the various elevations of the blocks and found areas of concrete carbonation with the inevitable reinforcement corrosion, these areas were logged for the report. The brickwork had areas of debonded or loose slip bricks at the floor levels and lintols.

Martech removed the loose material for safety reasons and assembled all the data and test results that combined into a comprehensive electronic condition report submitted to the consulting engineers for their interpretation and recommendations to their client.

Towering Inferno

Drill towers are a training facility for fire-fighters and usually built within a fire station facility for routine exercises. Drill towers are tall and often built from reinforced concrete with stairs and window openings to help firefighters deal with real-life situations, including running upstairs with heavy equipment and training with ladders and hydraulic platforms in confined spaces.

Martech have completed a concrete condition survey of a drill tower to a central London fire station part of the London Fire Brigade, one of the world's largest fire and rescue services. The LFB consulting engineers requested Martech to ascertain the nature and extent of any concrete and brickwork deterioration problems on the drill tower.

Martech engineers abseiled the external elevations and found the reinforced concrete to be suffering from advancing carbonation exacerbated by low concrete cover in some places. This combination has caused steel reinforcement corrosion and areas of spalling concrete. Previous old repairs were also found to be defective and failing.

The **Martech** report submitted to the consulting engineers on completion of the survey contained extensive details of the problem together with repair recommendations including the use of corrosion inhibitors and anti-carbonation coatings.

The ability of **Martech** engineers to abseil emergency services buildings and structures provides greater access flexibility in areas where space is limited or downtime prohibited.

Bridge Inspection and Investigation

Bridge inspections and structural investigations are an important part of managing the highway infrastructure in the UK to ensure continued adequacy for purpose. There are many and varied designs to cater for crossing roads, watercourses, railways etc each requiring specific attention.

Martech carried out a bridge condition visual inspection on behalf of consulting engineers on a 28m span road bridge crossing the Grand Union Canal in west London. The bridge was originally built for the railways during the thirties but was later adapted for highway traffic and comprised two 3m deep steel beams with cross girders supporting a concrete deck The elements inspected included the main and transverse girders, bearings, concrete deck, abutments and adjoining wingwalls.

Industrial rope access methods were adopted by **Martech** for the inspection work. The bridge steelwork was found to be suffering from corrosion to varying degrees depending on the location and condition of the existing coatings and was recommended to be grit blasted and recoated. Bridge bearings have long ceased functioning due to heavy corrosion and require cleaning and protection.

The brick abutments and wingwalls surveyed by **Martech** need localised repairs to cracks, spalls removal of vegetation etc. A full photographic record was made of the bridge making particular reference to the inspection findings.

Subsequently **Martech** also carried out a structural investigation of the rebar arrangements in the precast/insitu concrete composite deck of the bridge for the consultants to carryout a load assessment of the bridge.

Martech bridge inspections and investigations are fully reported and documented in reports to the consulting engineers who can combine them with their own findings and calculations, to make recommendations to their client for programming future bridge maintenance, reconstructions, budgets, schedules etc.

Assessment and Inspection of Buildings and other Facilities:

MARTECH take a closer look...

From the cover

The built environment within the UK is a valuable asset and to maintain that asset safely there needs to be a planned strategy of periodic inspection, review and repair – work that **Martech** in association with property owners and the engineering professions has carried out continuously for twenty years and coincidently a view supported by SCOSS in their paper, extracts of which we respectfully reproduce:

Introduction

1 SCOSS has been concerned for some time (1) at the potential for deterioration of buildings and other facilities during their working lives such that there results an inadequate reserve of strength against collapse of the whole or part of the structure.

2 Such a situation may arise through a variety of routes, for example:

Action:	Leading to:
Change of Use	Increased floor loadings; introduction of dynamic effects.
Material deterioration	Corrosion of reinforcement, loss of strength
Design deficiency	Old code requirements now known to be deficient
Alteration	Poorly controlled (in design or construction) alteration or refurbishment resulting in loss of structural integrity.
Quality Control	Built structure does not reflect designers intent
Lack of Maintenance	Ingress of water, loss of protective systems

3 Deterioration may affect the structural frame or its associated elements, or may be attributed to structural fixings of other components such as cladding or signage.

4 Our building stock represents a valuable asset; to individual owners, to occupiers with insuring/repairing leases, and to the nation at large that depends upon such facilities remaining serviceable throughout their expected lives. Historically we have not been good at nurturing these assets and recognising that they may need a planned strategy of periodic inspection, review and repair.

5 The business case for a planned assessment and inspection programme is strong.(2) It cannot be right that the built environment, in both public and private sectors, is allowed to deteriorate in an uncontrolled fashion. In addition to the business case however there is a statutory obligation to have regard to the state of buildings, and other structures, where their condition may cause an unacceptable risk to safety; there is also the necessary consideration of civil liability - a growing concern in today's litigious society.

Reference: SCOSS – the Standing Committee on Structural Safety, established in 1976 and supported by the Institution of Civil Engineers, the Institution of Structural Engineers and the Health & Safety Executive. Paper Ref: SC/T/02/03 link: www.scoss.org.uk/publications/rtf/AssessmentAndInspections2.doc

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Fire Damaged Reinforced Concrete

Most fire damaged reinforced concrete can be successfully and economically repaired but before any repairs are carried out it is necessary to carry out a thorough condition survey to determine the extent of the damage caused by the heat of the fire on both the concrete and the reinforcing steel.
Often it is necessary to determine that the structural integrity of the reinforced concrete has not been over stressed during the fire and in these circumstances **Martech** work closely with the appointed structural engineers.

Martech engineers have many years experience in this field and can recognise the tell tale signs of fire damaged concrete. A visual inspection together with non-destructive testing and exploratory cutting out of the fire damaged areas enable **Martech** to advise the client in a detailed report about the schedule of damage and suitable repair solutions.

Water – the essence of life

Many water and waste water treatment plants are constructed from steel reinforced concrete to a very high quality standard and go on to perform for many years with regular maintenance.

There are however process treatments that by their very nature can cause deterioration of the concrete and if this is sufficient then the steel reinforcement can then become at risk of corrosion.

Martech were commissioned by consulting engineers to inspect a reinforced concrete Granular Activated Carbon (GAC) filter tank on an operational water treatment works that was suffering from spalling concrete to the inside surfaces.

Martech carried out a concrete condition survey to ascertain the nature and extent of any concrete deterioration problems and report these findings back to the consulting engineers.

Martech engineers found the concrete to be suffering from visible and latent surface damage that appeared as surface pitting with dissolution of the limestone aggregate. This deterioration together with low cover to the reinforcement in some places caused corrosion and localised spalling of the concrete cover.

Martech submitted the report with recommendations for reinstatement based on EN 1504, European Standard for concrete repair, with particular emphasis on carrying these works out as soon as practicable.

Testing went Swimmingly

Maintaining large municipal swimming pools is a challenging and complicated business involving chemistry, safety, public relations and building maintenance. Looking after the structure of municipal swimming pools often involves the routine inspection of the reinforced concrete used in the original construction.

Martech are very experienced in this area of work and well aware of the effects chlorine treated water has on steel reinforced concrete, having inspected many such structures.

As an example **Martech** recently inspected a municipal swimming pool, part of a popular leisure complex in the West Midlands, to asses the nature and extent of concrete deterioration including the rate of reinforcement corrosion.

Martech tested the exposed concrete structure from the basement and found the pool to be suffering from chloride contamination of the concrete in conjunction with carbonation that had penetrated to the reinforcement and hence cracking and spalling of the concrete.

Martech engineers submitted their report to the client with advice for concrete repair to EN 1504 standards including the installation of an electrochemical cathodic protection system to provide long term durability to the structure.