



DIS

re:news

DESIGN INSTALLATION SYSTEMS, INC. 8110 River Drive • Morton Grove, IL 60053 • 847-470-8100 • www.disinc.net

Vol. 1, No. 2

Exceeding the Expectations of the Construction Industry Since 1982

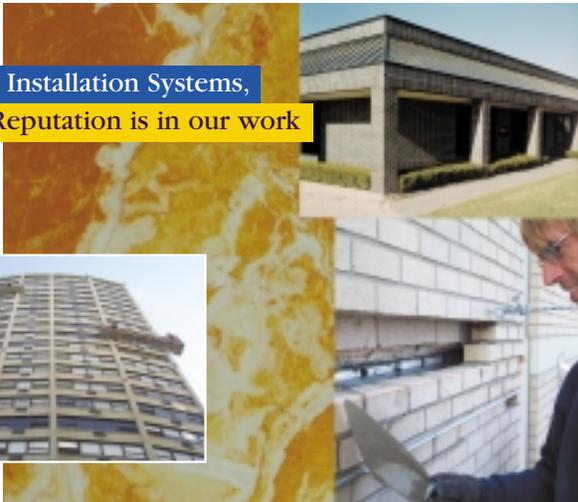
December 2003

Features

A

t Design Installation Systems,

Our Reputation is in our work



Introduction

Design Installation Systems, Inc. is a full service general contracting and building restoration contractor. Specialization in all aspects of exterior building restoration is one of our prime accomplishments. Among the most physically and technically challenging aspects in restoration work are concrete repair and preservation. Exterior concrete on high rise structures is exposed to deteriorating effects of rain, wind, temperature and atmospheric elements.

Concrete repairs are made using materials and methods developed over time. Recent advancements in protection include; modified repair mortars, high grade stainless steel or coated reinforcement, cathodic protection and protective coatings.

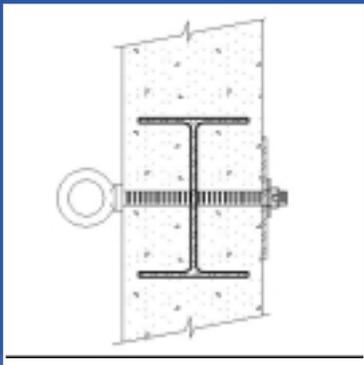
- Modifiers and additives create a large number of repair possibilities. It is important that repair mortars mimic the existing concrete in strength and expansion while at the same time achieve a bond to the parent concrete.

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- Corrosion of steel reinforcing causes problems as the corrosion expands. Coating embedded steel has become commonplace, cleaning and painting of all steel to remain now seems like a simple operation but these steps must be carried out in a meticulous manner for them to be effective. Adding new steel to a concrete patch is not limited to matching existing steel. Factory or field applied coatings vary from rust inhibitive primers to multi layered epoxy. Stainless steel is often used in place of carbon steel because of its resistance to rusting.
- Cathodic Protection is sometimes used to stave off corrosive actions caused by electronic interaction between concrete and embedded steel. It is an electro-chemical process of corrosion control, although the process has been around for more than 100 years, it has only recently been applied in this type of restoration.
- Concrete coatings are a first line of defense against the destructive forces of water and atmospheric contaminates. Carbonation of concrete is a progressive and destructive process caused by airborne carbon dioxide reacting with the concrete. This does not damage the concrete but can lead to corrosion of the steel within. Some coatings are designed to penetrate into the surface to prevent or even reduce the carbonation of concrete. Other coatings are designed to coat the concrete, protecting it to some extent from carbonation but most importantly reducing the entry of water into the concrete. Even small cracks allow rainwater to enter uncoated concrete. Freeze-thaw actions during temperature fluctuations cause cracks to expand, eventually allowing water to rust embedded steel.

(continued on page two)

Safety Tiebacks



Any time a scaffold is placed on an elevation to complete work, all equipment and safety lines must be tied back to the building. This requirement has led to a number of inventive solutions. Tying back to roof soil stacks, ringing cables around penthouses and clamping to fences or decks have all been tried in the past. However, in an emergency situation this tie back could be the only thing preventing equipment or personnel from falling to the ground. Safety or “roof” tiebacks are an important element in maintaining a building’s exterior but more often than not they are not incorporated into the building’s design.

Over the years Design Installation Systems has retrofitted a number of buildings with new safety tiebacks. The old method satisfied safety concerns of the time, but now they are considered inadequate or even illegal. Additionally, these methods often created problems with damaged roofing, plumbing or other building elements. As buildings age and maintenance programs become more aggressive the addition of roof tiebacks becomes increasingly necessary.

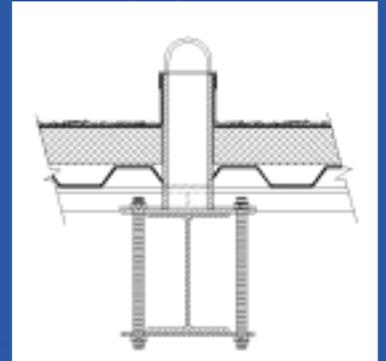
Simple examples of these tiebacks are shown here. These concept drawings may be modified to fit almost any aspect of a buildings roof design. As there are serious life safety concerns involved with the installation of these systems, it is recommended that a licensed engineer be involved in the design and installation process. Safety rated hardware must be adequately integrated into the buildings structure and maintained in such a way as to prevent corrosion or other damage that would lessen its effectiveness over time.

Building owners and management should seek professional assistance if they are considering upgrading their building with this safety feature. Design Installation Systems has worked with a number of such professionals and can provide guidance if needed. The following internet links may provide some additional information.

<http://www.nclabor.com/osh/etta/indguide/ig38.pdf>

http://www.pro-bel.ca/ras_1.htm

<http://www.osha.gov/SLTC/etools/scaffolding/suspended/index.html>



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Design Installation Systems has made a great commitment to acquiring and maintaining the equipment needed to achieve excellent results when restoring deteriorated concrete. Along with that commitment comes hiring and training numerous concrete specialists to complete

this work. Having the people with the proper training and work ethic makes the difference. A completed concrete project will look good when finished and will remain worry free for years. As the technology of the work progresses we keep pace and often help advance the trade with innovative techniques.

Concrete Restoration



Concrete restoration is completed in phases. The concrete structure needing repair work is first observed for delamination, cracking and spalling. Accessing the work is sometimes no easy task. The building is rigged for scaffolding and life safety equipment. Once that demanding task has been achieved the inspections can begin in earnest. All suspect areas are sounded out with a hammer; hollow or dull sounds indicate problems. Once the areas are defined preparation of the work area begins.



Supplemental anchorage is typically stainless steel. Bolts, eyehooks and threaded rods are all used. Set into epoxy filled holes and lashed to existing steel, the new steel works with the old to reinforce and anchor the patch. All existing steel to remain is cleaned and coated with a rust inhibitive primer. In some cases (as shown above) cathodic protection is added (see "Structural Elements" in this issue). Once formwork is in place the area is ready for new concrete. The concrete forms are custom made from wood, steel or plastic and are designed to remain in place until the fresh concrete has cured enough to retain its shape and hold itself in place.



Areas marked for repair are saw cut then chipped into regular shapes. The bad concrete is removed, and then good, sound concrete (parent concrete) is chipped away until the desired configuration is achieved. Removal is done with the final patch in mind; it must be a minimum thickness with sufficient bar coverage, have a certain shape, be able to accommodate supplemental anchorage and reinforcing, and needs to fit into desired esthetic parameters.



After removal of the form, the concrete is inspected for defects. If needed, the edges are feathered by grinding so they match adjoining surfaces. After a period of curing the concrete is usually painted to protect the new patch. Placing a fresh coat of paint over the patch, then repainting the entire building, protects the concrete and makes the patch difficult to find.

Project Profiles



■ 1960 Lincoln Park West, Chicago, Illinois

Client:	Draper & Kramer, Inc.
Consultant:	Klein & Hoffman, Inc.
Assignment:	Concrete & Balcony Rehabilitation
Duration:	3 Years (1999-2001)

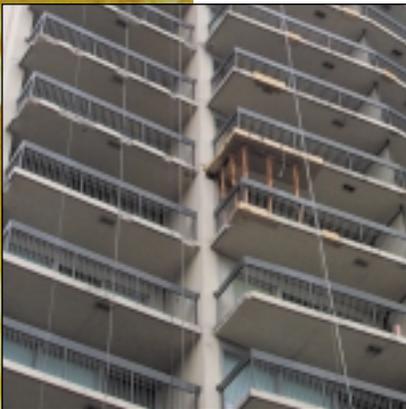
This prestigious Lincoln Park building was in need of major concrete rehabilitation. DIS completed a comprehensive concrete repair and coating project over a three year period. Specially made concrete forms were used to match the existing profile of the slab edge and columns. After the concrete work was complete the balcony handrails were repaired and painted. To preserve the repairs, window frames and concrete joints were caulked and all exposed concrete was coated. Decorative waterproof paint was applied to vertical surfaces and a multilayered traffic bearing membrane was applied to balcony surfaces.



■ IIT, Chicago, Illinois

Client:	Illinois Institute of Technology
Consultant:	Soodan & Associates, Inc.
Assignment:	Concrete Restoration
Duration:	2 years (1998-1999)

This project consisted of four buildings, three of which needed concrete repairs as a major component of the restoration work. Slab edges and columns all needed concrete repairs for spalls and delamination, but in some cases a special compound was used to seal and bridge over cracks prior to painting. This method significantly reduces the cost of repair work and increases the life of the concrete coating. After completion of the concrete and caulking work, the concrete surfaces were coated with a waterproof paint.



■ 3470 Lake Shore Drive, Chicago, Illinois

Client:	LaThomus Property Services
Consultant:	Klein and Hoffman, Inc.
Assignment:	Concrete & Balcony Restoration
Duration:	In Progress

Much of the damaged concrete needing repair was found at balcony posts on this northshore hi-rise. Rusting, embedded steel is a major contributing factor in delamination and spalling of concrete. Design Installation Systems was asked to make repairs and remove the cause of these difficulties. After removal of the balcony rails, all damaged concrete was repaired to high standards and tight tolerances. These concrete repairs were the foundation for the redesigned and newly installed railings. Without a good, strong surface to mount the railings to, the design would suffer.



■ Kennelly Square, Chicago, Illinois

Client:	Kennelly Square
Consultant:	Schoengart Associates, Inc.
Assignment:	Concrete & Masonry Restoration
Duration:	In Progress

This near north conversion is a mix of brick and concrete construction. In need of concrete repairs at slab edges, beams and columns; Design Installation Systems was asked to do the work. The comprehensive project included not only concrete restoration, but also had masonry rebuilding and repair along with a great deal of recaulking work at window perimeters. DIS was able to complete all this work without the need for subcontractors and the condominium building has the added benefit of receiving a single source warranty for future repair and maintenance.

Cathodic Protection

Anytime steel reinforcing within concrete rusts, it expands and causes damage, (see construction notes in this issue). In an ideal installation concrete reinforcing has adequate concrete cover and the concrete has a protective coating to prevent infiltration of harmful elements through that cover. When water, chlorides or even carbon dioxide, infiltrate the protective concrete layer, corrosion of steel begins and concrete damage results.

Chlorides present within the concrete, along with moisture, cause an electrical charge to flow through the rebar. As electrons leave portions of the rebar, that section of the reinforcing turns to rust. Chloride containing admixtures are no longer recommended for concrete repairs but existing structures may contain them. However, chloride containing deicers and other applications can add this element to the building after construction.

Concrete that contains little or no chloride can also be susceptible to rusting steel. As atmospheric carbon dioxide “seeps” into exposed concrete the internal steel becomes vulnerable to corrosion. This carbonation of the concrete is a major concern in all applications because the carbon dioxide reacts with the lime present in all concrete. Regardless of the source of the electrical current running through the concrete the result is rusting rebar and failed concrete. There are two types of Cathodic Protection (CP) used as a method of protection for embedded steel.

Galvanic CP introduces a metal anode into the concrete that is more likely to corrode than the steel. This method often uses zinc as a “sacrificial metal” deteriorating before structural steel can be attacked. This system is limited only by the amount of anode material cast into the fresh concrete. The deteriorating zinc does not expand and does not become a problem as the process advances.

Impressed Current CP introduces an offsetting electrical current for protection. In this, an electrically conducting material is placed and a current is run through it. There is no “sacrificial metal” in this system so no deterioration of the protective elements occurs. However, this system does need an external power source and will need to be installed and maintained by a knowledgeable electrical technician.



Galvanic Anode in a mortar shell is tied to the reinforcing bar before concrete patch is poured. The anode deteriorates in place of the embedded steel and thereby protects the concrete.

Clarifications and Corrections

This newsletter is a compilation of ideas and research completed by the office staff and field representatives of Design Installation Systems. Although we take great care in preparing these newsletters we acknowledge the possibility of errors or omissions on our part. It is our intent to be honest and complete when putting together these newsletters; to that end we will provide Clarifications and Corrections when needed. We invite those who have comments regarding previous issues to call our office. We will include those, as needed, in subsequent newsletters.

In the first issue of “**DIS re: news**”, on page three, we quoted City of Chicago permit fees for sidewalk canopy. Although we believe these amounts to be currently correct, we regret that we failed to mention that these amounts are *per lineal foot*.

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