NPCA WHITE PAPER

GRAFFITI-RESISTENT PRECAST CONCRETE

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Graffiti-Resistent Precast Concrete

Beyond its unsightliness, the cleanup and removal of graffiti costs American taxpayers millions of dollars each year. Costs are currently estimated at roughly $3 to $5 per person a year. Recently, Los Angeles County alone spent about $28 million in annual graffiti-remediation efforts.

There are, however, a few ways to make cleanup of graffiti-laden surfaces easier.Graffiti media

Three main factors influence the removal process of graffiti from precast concrete products:

1. Chemical makeup of the graffiti media used (solvent, pigment or polymer)
2. Type of concrete coating onto which removal product is applied
3. Substrate porosity and absorbency

By virtue of graffiti's significant organic solvent content, graffiti's media facilitates an invasion of color into porous and absorbent substrates, thus making it difficult to remove (blue and red are the most difficult colors to eliminate). In contrast, latex paints are much easier to remove, because the solvent is predominantly water.

Because of this, the absorption of organic, solvent-borne graffiti into a heterogeneous, highly porous substrate

presents the most formidable challenge for effective graffiti removal from precast concrete surfaces.

In addition, the higher the quality of graffiti media (containing durable resins and fade-resistant pigments), the more difficult it is to remove. Media of poorer quality contain lower levels of pigments and resins that have poor coverage, which may tend to run or sag more, resulting in thinner, easier-to-remove graffiti.

Pre-treatment

When addressing potential damage inflicted by graffiti, precasters and project owners can opt to apply a pretreatment, post-treatment or a combination of both on the concrete. Pretreatment involves the application of graffiti-resistant coatings before installing the concrete in the field. Post-treatment involves the removal of graffiti using a combination of liquid cleaning agents, washing techniques and procedures specified by the supplier.

Pre-treatment. Where the potential for graffiti is a concern, project owners and precasters may opt to apply one of several types of anti-graffiti coatings or paints to precast concrete surfaces. These clear coatings are designed to prevent spray paints, markers, grease pencils or other graffiti media from penetrating the concrete surface. Maintenance employees can then remove graffiti by following the coating manufacturer's instructions (often using a designated cleaning agent). Common types of graffiti-resistant coatings used in pretreatment include single-pack and two-pack paints; acrylics; polyurethanes (clear and aliphatic); and epoxies:

- Single-pack paints (either solvent-borne enamels or water-based acrylics) provide slight resistance to graffiti, as the solvents in the graffiti media and in the graffiti-removing agent will affect single-pack paints, potentially causing softening, wrinkling or dissolving of the paint. Two-pack paints are less porous and more cross-linked, therefore more chemically resistant and less affected by solvent present in graffiti and graffiti-removing agents.
- Acrylics offer a relatively low material cost and are easy to apply, reapply and repair after cleaning graffiti.
- Polyurethane coatings form a tough, hard film that is highly resistant to solvents and abrasive forces. They are available in pigmented or clear formulations that offer quality gloss and color retention. They also provide an elevated chemical resistance and hardness.
- Epoxies form a tough, hard film with excellent resistance to solvents and abrasion.

When determining which graffiti-resistant coating to apply to precast concrete, all options should be weighed, including sacrificial, semi-sacrificial or non-sacrificial coatings.

- Sacrificial coatings consist of a clear, thin-film wax emulsion applied to the surface. They are almost unnoticeable on the concrete substrate and are intended as a one-time application. Once the graffiti is removed from the surface coatings, reapplication is needed. These coatings are generally designed to protect a substrate in case of an occasional graffiti attack (every six months).
- Semi-sacrificial coatings are typically acrylics that shed a few microns of the top layer each time graffiti is removed. After several cleaning cycles, and before the coating is completely worn away, an additional coat or two is required to restore the original appearance.
- A non-sacrificial coating is one that resists permanent damage or discoloration from graffiti, and it is also resistant to harsh graffiti-removal agents and processes used to clean the surface. Such coatings are glossy and chemically inert, thus minimizing the ability of the graffiti to penetrate or adhere to the coating, making subsequent removal easier. Non-sacrificial resistant coatings are more prevalent in areas of frequent graffiti attack (monthly occurrences).

Post-treatment

If graffiti is to be removed from a precast concrete surface, it must be removed quickly and properly, as it becomes increasingly difficult to remove from the concrete substrate with passing time.

Many products and procedures are suitable for removing spray paint, felt-tip markings and other forms of graffiti. The manufacturer's directions should always be followed when using products and removal processes. Numerous proprietary chemical strippers are available in the precast concrete industry, many of which contain a citrus-based solvent, methylene chloride or potassium hydroxide.

Citrus-based solvents are the least aggressive and may not work on certain graffiti media, but they are deemed as some of the safest to use and often have less stringent disposal requirements.

Methylene chloride-based products can also be used to remove graffiti media. The proper application may differ, but typical procedures recommend brushing methylene chloride onto the affected surface, waiting a predetermined time and then rinsing with water while brushing. Oxalic acid

or hydrogen peroxide can also be used to help bleach out some of the concrete pigment during placement. Solutions of sodium hydroxide, xylene or methyl ethyl ketone are also helpful in removing graffiti.

Effective cleaning of graffiti-affected precast concrete can also be accomplished with water blasting and sandblasting. Abrasive cleaning can remove graffiti, but it can also remove the top layer of concrete, making it more vulnerable to weathering and additional graffiti tagging. If water blasting or sandblasting is applied to the precast concrete surface, review ASTM D7089-06, "Standard Practice for Determination of the Effectiveness of Anti-Graffiti Coating for Use on Concrete, Masonry and Natural Stone Surfaces by Pressure Washing." A pressure-washed area may look different from the rest of the surface because the top layer of concrete has been removed. To help resist further graffiti attacks, apply a graffiti barrier coating or sealer.

Sandblasting includes the use of a tungsten-carbide nozzle that meters sand into the water stream before it exits the nozzle. Only a professional should perform this type of cleaning, as the sand can etch the concrete surface and create an even bigger mess than the one you started with.

Conclusion

Graffiti defacement remains a serious and costly problem in all parts of the country. Besides its unsightliness and contribution to urban blight, graffiti is believed to result in lost revenue associated with a decline in property values and retail sales. Although there is no guarantee that graffiti won't mar your products, protective coatings and pretreatments make it easier to clean up and manage.