INTRODUCTION TO ICRI TECHNICAL GUIDELINE NO. 710.2-2014,

GUIDE FOR HORIZONTAL WATERPROOFING OF TRAFFIC SURFACES

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Having been born and raised in Michigan, I am too familiar with the poor condition of roads, parking lots, and walkways. In 2014, public spending on road repair in just one Michigan county was close to $50 million, with an additional $5 million designated for pothole repair. Of this spending, close to $1 million was designated specifically for waterproofing membrane projects.[1]

These public expenditures—along with the money spent by private owners for repair and replacement of parking decks, walkways, railways, bridges—add up to a significant financial burden.

Properly designed high-build traffic membranes (Fig. 1) can help alleviate many of the wear-and-tear problems mentioned previously. Potential applications include:

- Protecting the concrete substrate against chemicals, oil, and other contaminants from vehicles;
- Preventing permeation or intrusion of water and waterborne chloride ion to the embedded steel reinforcement (reinforcing bars), preventing corrosion and related concrete deterioration;
- Providing an aesthetically pleasing concrete surface that reduces deterioration caused by weathering and traffic; and
- Enhancing light reflectivity and slip resistance.

Fig. 1: Waterproofing membrane applied to pedestrian plaza

To assist in the selection and application of fluid-applied high-build waterproofing systems, the ICRI has published Technical Guideline No. 710.2-2014, "Guide for Horizontal Waterproofing of Traffic Surfaces." This document is the culmination of work by experienced engineers, contractors, and suppliers active on ICRI Committee 710, Coatings and Waterproofing.

These guidelines have been developed for a diverse audience, including the facility owner, designer, developer, operator, material supplier, installer, and property manager. By providing the necessary details available for system design, installation, and product selection, this guide will help to protect concrete from deterioration caused by environmental and service conditions. Additional considerations discussed in the guide include budget constraints, operational considerations, code requirements, regulations, and material warranties.

Waterproofing a traffic surface is a complex, multi-step process. Waterproofing systems for the protection of concrete structures may be formulated to provide a wide range of properties, ultimately affecting the performance of the traffic membrane system.

Several options are available when selecting the proper material for the waterproofing membrane. The five most commonly used chemistries are polyurethane, polyurea, epoxy, methyl methacrylate, and cementitious. Selecting the proper membrane material will depend on the specific application requirements, location, and substrate.

Most of the materials are available in either one- or two-component variations. The one-component materials only require mixing of the material in the provided package to ensure consistency of the end coating. These materials cure by reacting with ambient moisture and may be significantly affected by changes in temperature or humidity.

With two-component materials, it is critical to properly mix the components together in accordance with the manufacturer's written instructions. These products can be tailored to provide a faster cure and quicker turnaround if necessary. However,

if the material is not correctly proportioned and mixed, the traffic membrane system may not cure or perform properly.

The specific material types referenced in the guide include:

- Polyurethane—These organic polymers are formed by the reaction of an isocyanate with a hydroxyl-functional resin. They are available in either one- or two-component versions, either aromatic or aliphatic (UV-stable).
- Polyurea—A fast-setting elastomer derived from the reaction product of an isocyanate component and an amine-terminated resin blend. Polyurea will generally provide superior physical properties over polyurethanes, although with a cost premium.
- Epoxy—Epoxy is another two-component organic polymer material, widely used in the construction industry since the early 1960s. These materials are perhaps the most commonly used interior systems in construction today.
- Methyl methacrylate (MMA)—MMA is an acrylic resin cured with a specified amount of benzyl peroxide. These compounds are 100% reactive and may range from soft coatings, similar to contact lenses, to hard membranes, such as acrylic glass.
- Cementitious—These products are distinctly different from the polymer types in that they contain a dry aggregate mixed with liquid materials on site. They are readily mixed and applied using a variety of tools and methods, including trowel, roller, spray, broom, and notched squeegee with back roll.

In addition to proper material selection, several important factors should be taken into account:

- Owner requirements;
- Service conditions;
- Type(s) of construction; and
- Condition of the structure.

The manufacturers of horizontal waterproofing membranes require these materials to be applied to clean, sound substrates. Existing structures are generally evaluated to identify potential deficiencies in the concrete substrate to identify the repairs necessary to restore the concrete to a sound condition (Fig. 2). Once concrete substrate deficiencies are addressed, surface preparation is performed to ensure proper adhesion of the traffic membrane system. The quality of the surface preparation directly impacts the performance of the specified waterproofing system.

System manufacturers should provide detailed instructions for optimal surface preparation, including specifying a satisfactory concrete surface profile (CSP) (Fig. 3). Most manufacturers recommend a CSP of 2 or 3 (refer to ICRI Technical Guideline 310.2R[2]), which can be accomplished by a number of methods, each using a selection of tools, equipment, and materials dependent on the type of surface to be prepared and the type of system to be installed.

Fig. 2: Crack and concrete spall repair

Fig. 3: Concrete surface profile (CSP) chips on prepared surface

Not all traffic membrane systems are ideal for every application. Materials may perform differently with respect to scratch resistance, crack bridging, UV resistance, and cure times. Individual product data and test methods should be reviewed when comparing material performance relative to the desired application location and substrate.

The new ICRI Technical Guideline No. 710.2-2014, "Guide for Horizontal Waterproofing of Traffic Surfaces," presents an overview of the complexities encountered when applying a water-

Fig. 4: Primer application during polyurethane system installation

Fig. 5: Waterproofing system installation at deck

proofing membrane (Fig. 4) on various traffic surfaces. Proper selection of the system will extend the service life of the concrete substrate by reducing the potential for corrosion and other concrete-related deterioration. These materials may also be used as a way to improve aesthetic appearance and draw contrast to the surrounding area (Fig. 5).

On behalf of ICRI Committee 710, Coatings and Waterproofing, we hope you find this guide useful for waterproofing applications.

REFERENCES

1. Road Commission for Oakland County, "RCOC Preparing for Nearly $50 Million Worth of Road Construction for 2014 Season," *RCOC's Road Report*, 2014, http://www.rcocweb.org/Lists/Publications/Attachments/180/1Q%202014.pdf.

2. ICRI Technical Guideline 310.2R-2013, "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair," International Concrete Repair Institute, Rosemont, IL, 2013, 48 pp.

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