



## Restoring Sacramento's Medical Center Water Reservoir

with Zirconia's CeramycGuard

### INTRODUCTION

Sacramento's iconic Medical Center Water Reservoir, a 12-story concrete structure built in 1939 and seismically reinforced in 1996, supplies 3 million gallons of water to the surrounding community, including UC Davis Medical Center. Now over 80 years old and showing advanced corrosion, the reservoir, faces challenges that make demolition and replacement prohibitively costly, both in terms of expense and the impact on water capacity. To address these concerns, innovative Ceramic Surface Treatment (CST) coating technology is being applied to restore the structure, seal its aging concrete, and extend its service life for decades to come.

### THE PROBLEM: CONCRETE DEGRADATION

The reservoir's lower concrete jacketing, added in the 1990s, exhibited more extensive corrosion and cracking than the original concrete from the 1930s. In both sections, the concrete had lost a significant amount of cement binder, resulting in a highly porous surface. This degradation has led to rebar spalling, extensive vertical and diagonal cracking (every 6-12 inches), cement degradation, loss of binder, increased porosity, and lowered pH levels within the concrete. These are all signs of advanced concrete corrosion, which could lead to the loss of this vital infrastructure asset.

### THE SOLUTION: CERAMYCGUARD™ CERAMIC SURFACE TREATMENT

Zirconia's new CeramycGuard™ Surface Treatment (CST), based on a nanoscale version of Roman Cement (alumina-silicate polymer), was used to heal and seal the concrete surface. This unique inorganic polymer technology is water-based and applied using techniques similar to organic coatings, but with significant differences in functionality. Nano-scale ceramic particles replace the lost cement binder, penetrating deep into the pores and cracks. They react with calcium hydroxide and other alkali elements, gluing (rebonding) the cement, sand, and aggregate, forming a durable "skin of granite". The use of CeramycGuard will help to preserve this important water infrastructure asset well into the future.

### BENEFITS OF CERAMYCGUARD™

The CeramycGuard™ treatment reverses the effects of corrosion (aging), leaving the surface resistant to future degradation from carbonation, freeze-thaw cycles, and pollution. While the treated concrete may not appear perfectly new, it is now in a "better than new" condition, offering enhanced long-term resistance to weathering and corrosion - dramatically extending the life of this structure. Additional benefits include:

- **Thermal Compatibility:** CeramycGuard™ is thermally compatible with concrete, mitigating issues from California's summer heat and thermal expansion.
- **Chemical Resistance:** The glass-phase barrier chemistry of CeramycGuard™ is unaffected by carbonic acids in rainwater and airborne chemicals from surrounding areas.
- **Warranty:** CeramycGuard™ offers a 25-year non-disbondment warranty, the longest in the industry.



### PROJECT DETAILS: APPLICATION AND EQUIPMENT

The CeramycGuard™ application process was developed through extensive trial and refinement by Resource Development Company's expert team. Led by coatings specialist Rich Brown, RDC's Lead Foreman, the team engineered a precise delivery system to transport CST material 124 feet to the top of a 12-story structure. This innovative system ensured rapid, efficient coverage – filling cracks and voids in the aging surface – while protecting 46,000 square feet of vertical concrete in just four days.

- **Sprayers:**
  - o Airless Sprayer 70-1 Graco King 180cc (bottom end)
  - o Airless Sprayer 70-1 Graco King 290cc (bottom end), used for elevated sections
  - o Graco Silver Cloud Mastic Gun (Titan RX-80 was used as a backup)
  - o Tip size: 535
- **Roller:** 1 1/4-inch nap roller from Purdy
- **Hose:** 3/8-inch line, up to 300 feet
- **Efficiency:** 12,000 square feet in a 6-hour period, using 120 gallons of CeramycGuard™
- **Mixing:** 3 gallons per mix to feed pump, stirred with drywall mud mortar mixer with high-torque drill

### APPLICATION TECHNIQUE

The spray application involved a cross-hatching technique to direct material into the concrete surface bug holes, and cracks (surface profile of CSP3). The volume and velocity of material delivery addressed the need to flood-coat the severely corroded concrete with significant cement binder loss. Spray application was followed by a cross-hatching back roll to infill cracks and deeper voids. The roller's holding capacity allowed for massaging-in of the CeramycGuard™, enhancing its efficiency in filling cracks.

### ENVIRONMENTAL CONSIDERATIONS

This application was performed near the UC Davis medical facility. Because both the PoreBlocker (colloidal silicate) and CeramycGuard™ coating are water-borne, there were no OSHA limitations or environmental concerns related to VOC emissions. Remains of the coating were allowed to harden and discarded as common waste.

### LONGTERM BUDGET IMPACT

This new composite ceramic coating system will reduce the potential for corrosion, and thus reduce the cost of maintenance over the long term for the City of Sacramento. More importantly, this critical infrastructure asset which serves the city will not have to be torn down and rebuilt.

### CONCLUSION

The successful restoration of Sacramento's V-Street Water Reservoir demonstrates the effectiveness of PoreBlocker™ and CeramycGuard™ technologies working synergistically in addressing concrete corrosion and extending the lifespan of critical infrastructure. The end result is the restoration and long-term preservation of this important water infrastructure asset.

