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PRESERVATION
SJK
ARCHITECT/ENGINEER

6 October 2016

Roger Klein
Frankfurt-Short-Bruza Associates, P.C.
5801 Broadway Extension, Suite 500
Oklahoma City, Oklahoma 73118-7436

Re: Interior Rehabilitation of the Oklahoma State Capitol, site visit report no. 202
SJK No. 2016.03

Dear Roger,

I visited the Oklahoma State Capitol on 6-7 and 11-13 July 2016. Following is a short narrative on items of note during my visit pertaining to historic preservation.

Marble floor Poultice Cleaning
While on site and with the aid of Jeff Holmes, an independent consultant representing ProSoCo, Inc. I was able to perform marble poultice testing on the third floor Senate Office suite in the northeast back corridor where a stair will be placed in the future. In this area are deep seated stains from the oil-based vinyl tile adhesive that had previously been removed.

At that time, we tested three marble poultice products: *Sure Klean Marble Poultice* mixed with water; *Sure Klean Marble Poultice* mixed with *Consolideck Cure and Seal Remover*; and *Consolideck Oil and Grease Stain Remover*. Each application was tested in two separate areas. Product sheets for these three materials are included in the appendix. The *Sure Klean Marble Poultice* applications were mixed until they were the consistency of peanut butter, were applied with about 1/2-inch thickness, and covered with paper and taped at the edges. The *Consolideck Oil and Grease Stain Remover* was applied straight from the container and was about applied with about 3/16-inch thickness. Each application was installed twice in each area and was allowed to dwell for 24 hours each time prior to removal and reapplication (Figures 1 through 6).

None of these applications were successful in satisfactorily removing the marble stains. I have concluded that marble floor tile that has been stained with this oil-based adhesive cannot be removed using the technology presently available and that the only recourse is to either accept the stains or replace the tile with new Alabama Marble.

Other stains in the corridors on the first and second floor corridors were also tested to see if the poultices will lift these stains. In some cases, the stain was found to be within the "Betco Hard as Nails" top coat and can easily be removed wen the top coat is stripped away (Figure 7). In other cases, the stains are protected beneath the top coat and therefore could not be reached (Figure 8).

Observation of Cracks in Marble Floors
We noted several different types of cracks in the marble floors. One type of crack occurs typically at the corners of the corridors that surround the rotunda near the stairs (Figure 9). A second type of crack only occurs within the joints between the tiles and becomes manifest because of the collection of dirt in the

crack (Figure 10). A third type of crack is radial and can be seen in the second floor rotunda radiating outward from the center floor opening. The fourth type of crack is a chipping that occurs where tiles abut (Figure 11). All of these cracks are readily apparent because they have been filled with a build-up of debris that is impregnated in the top coat on the marble (Figure 12).

Past Marble Floor Tile Repairs

I have discussed these marble repairs in the past and will only mention them briefly. There is a collection of plastic repairs throughout the Capitol that are unsightly and should be replaced during the Rotunda restoration (Figures 13 and 14).

Marble Tile Sounding

In the second floor rotunda I sounded the marble tiles around one of the radial cracks and marked off the delaminated tiles (Figure 15). This sounding shows that what would appear to be cracks in the concrete structural floor that projects up through the marble tile. The cracks do not always project directly up through the cracks but are assumedly within the marked delaminated area. The sounding would indicate that further cracks may occur in the delaminated areas that do not presently exhibit cracks.

Coring of Marble Tiles

Three locations were chosen within the public corridors of the Capitol to remove cores at cracked marble locations: first floor northwest; second floor northwest; and fifth floor northwest. Each core was approximately 2 inches in diameter and extended down into the structural concrete.

The first floor core revealed that the marble was 1-1/4-inch-thick with a concrete topping slab beneath that was 1-3/4-inch-thick. The marble crack continued directly down into the concrete topping and structural slab. The structural slab crack was straight indicating that it was a cold joint (Figures 16 and 17).

The second floor core revealed that the marble was 3/4-inch-thick with a concrete topping slab beneath that was 3/4-inch-thick. The marble crack continued directly down into the concrete topping and structural slab (Figures 18 and 19).

The fifth floor core revealed that the marble was 1-inch-thick with a concrete topping slab beneath that was 1-1/4-inch-thick. The marble crack continued directly down into the concrete topping slab (Figures 20 and 21). In the structural slab a coal tar impregnated fibrous filler was exposed. It is believed that this may be an expansion joint in the structural slab.

Plaster Cracking in the Corridor of the Supreme Court

I viewed the plaster cracking of the north wall of the second floor Supreme Court corridor (Figure 22). It was noted that this is a wall that was not original but was added soon after completion of the Capitol in order to gain additional office space. Probing of the cracked area revealed that the cracking occurs in precast plaster elements that were laid up in the wall made of clay tile and are placed between the clay tile and concrete structure above. Moisture expansion of the clay tile is crushing the precast plaster which is relatively week and brittle compared to the clay tile and concrete.

Paint Finishes
I did some preliminary original color identification on the fifth floor rotunda pier capitals. This testing was incomplete but seemed to indicate that the original color in these corridors were monochromatic and either light green or tan in color (Figure 23).

Meeting with Evergreene Architectural Arts
During the second week visit representatives and I met with Terry Vanderwell of Evergreen Architectural Arts. We gave Evergreene a full tour of the building and developed a plan whereby they would perform some original color analysis and then develop a plan to come up with color schemes for the Rotunda, corridors and (eventually) other monumental spaces.

Conclusions
Cracking in the marble floor is the projection of cracks in the concrete directly beneath. Contemporary construction would dictate the inclusion of expansion joints in the concrete and marble. However, this was not the practice during the era in which the Capitol was constructed. We recommend repairing most of the cracks in place and obscuring the cracks by removing dark debris and grouting the cracks with a light grout. In areas such as at the corridors where expansion joints are suspected beneath the marble cracks, these marble tiles should be replaced and retrofit with expansion joints to accommodate further movement without cracking.

Further cracking within the plaster of the Supreme Court entry corridor should be anticipated. Such cracking should be easy to repair.

Further paint color analysis should be performed in the rotunda corridors.

Respectfully Submitted,

Stephen J. Kelley, FAIA, SE, FAPT

Figures

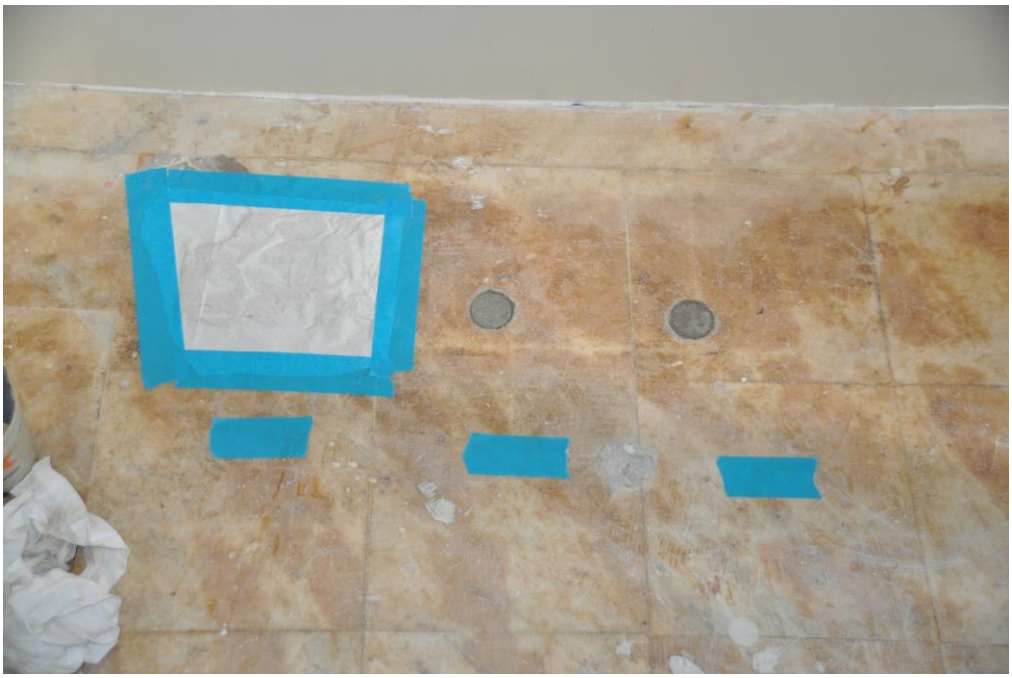

Figure 1 *– Poultice testing on the third floor marble floor tile.*

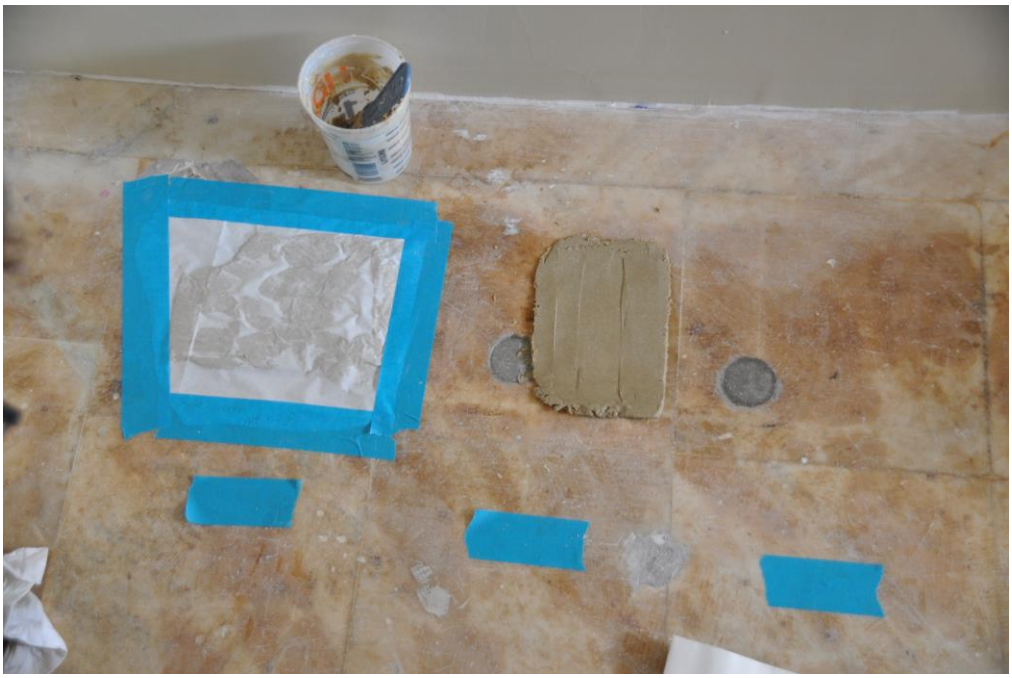

Figure 2 *– Poultice testing on the third floor marble floor tile.*

Figure 3 *– Poultice testing on the third floor marble floor tile.*

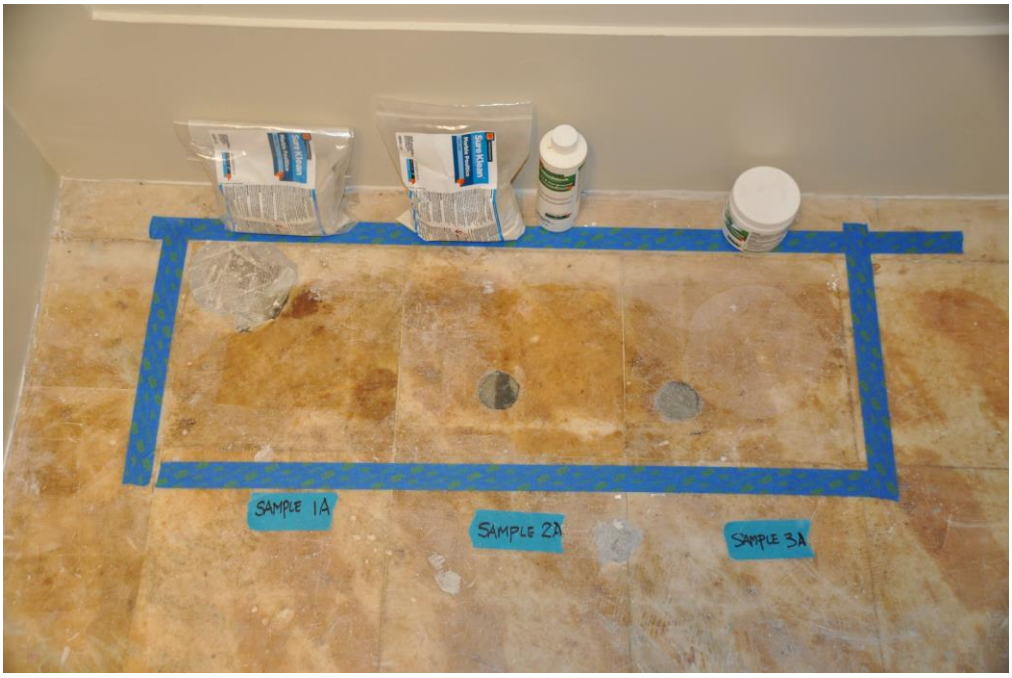

Figure 4 *– Unsatisfactory results of poultice testing on the third floor marble floor tile.*

Figure 5 *– Poultice testing at a second area on the third floor marble floor tile.*

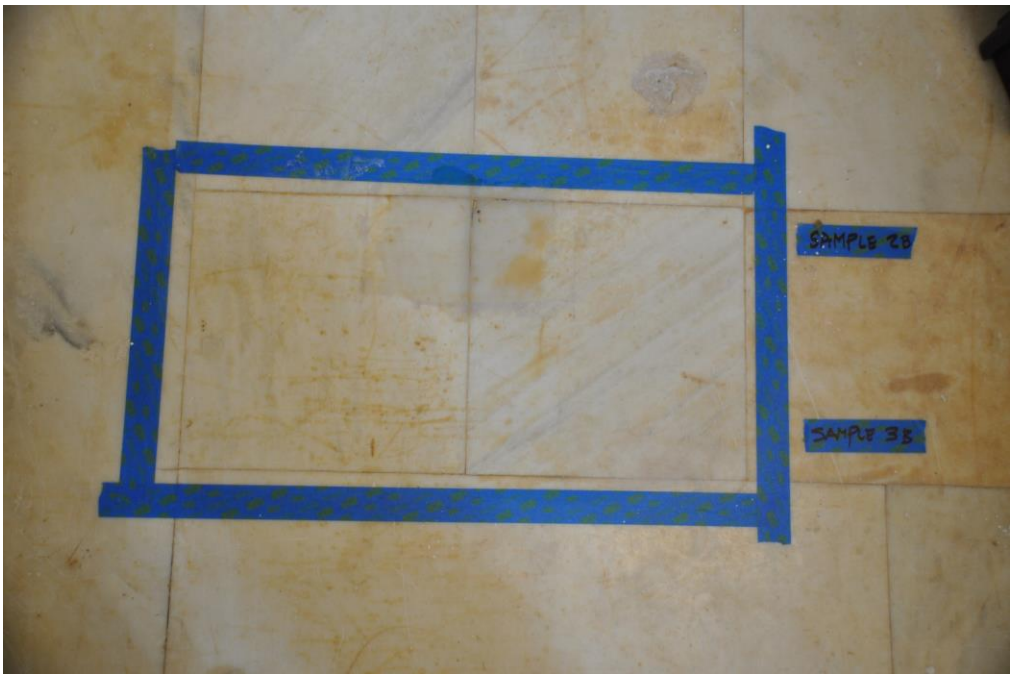

Figure 6 *– Unsatisfactory results of poultice testing at a second area on the third floor marble floor tile.*

Figure 7 *– Cuprous stain on the marble floor in the second floor rotunda was found to be on the wax topcoat rather than in the marble.*

Figure 8 *– Numerous stains were found to be below the wax topcoat necessitating removal of the topcoat before attempting stain removal.*

Figure 9 *– Cracks in the marble tile floor within the corridors surrounding the rotunda. These cracks typically run perpendicular to the corridor.*

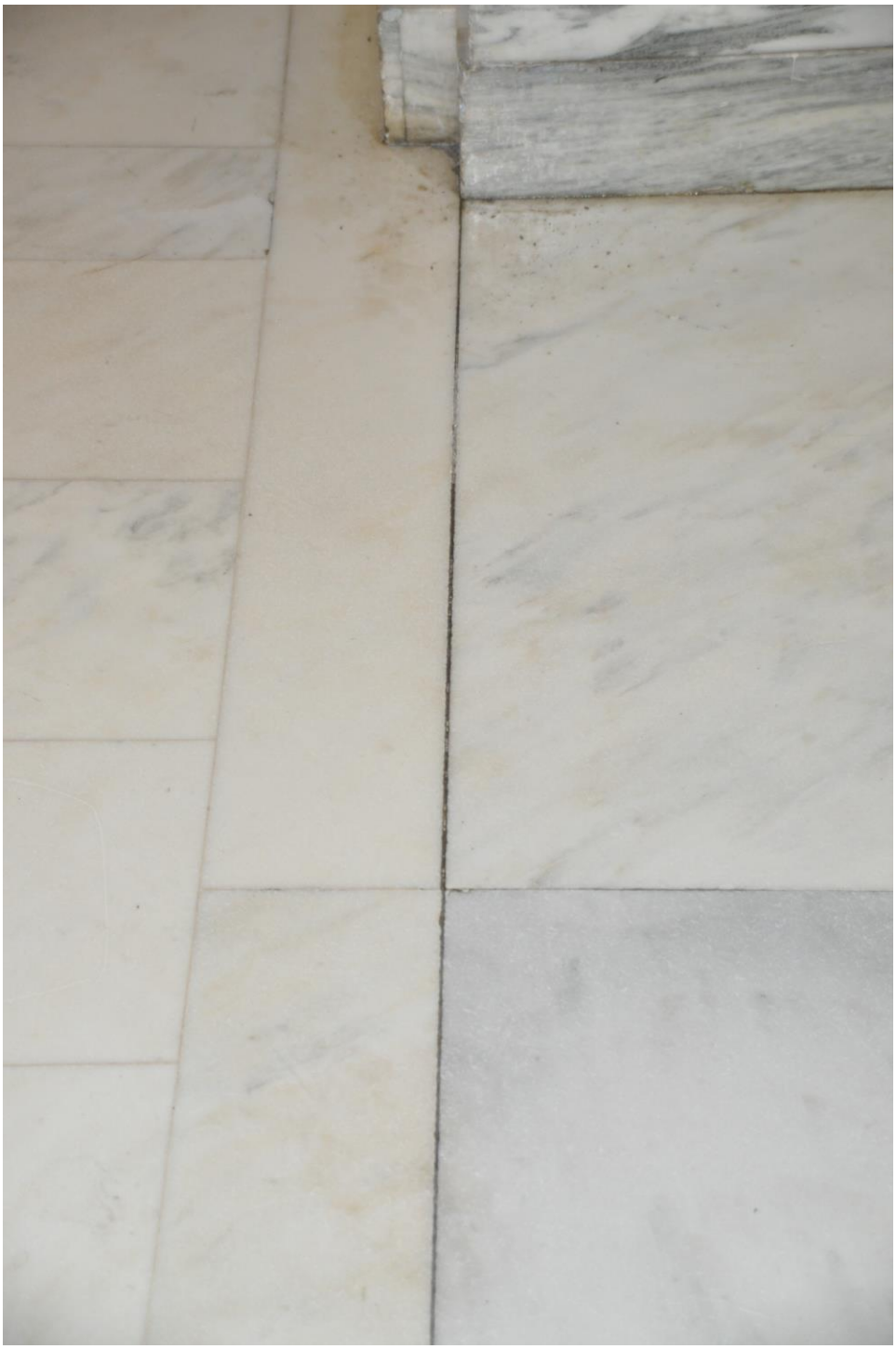

Figure 10 *– Cracks that occur only within the mortar joints between floor tiles.*

Figure 11 *– Chips in the tiles along mortar joints – possibly from compression.*

Figure 12 *– Close up view of one of the marble tile cracks. This reveals that the cracks are old, they are filled with dirt and dust (which makes them easily apparent), and that the dirt is beneath the wax topcoat.*

Figure 13 *– Unsatisfactory plastic repairs to the marble flooring performed prior to the present project.*

Figure 14 *– Unsatisfactory plastic repairs to the marble flooring performed prior to the present project. Note that ferrous anchors that have been left in place have further discolored the marble.*

Figure 15 *– Blue tape demarcates delaminated marble tiles in the vicinity of a radial crack.*

Figure 16 *– 2 inch diameter core removed at a crack through the marble at the first floor. Notice that the crack extends down into the concrete topping.*

Figure 17 *– Removed sample from first floor coring.*

Figure 18 *– Removal of core sample from second floor Rotunda.*

Figure 19 *– Sample removed from second floor rotunda. The marble seems to be well-adhered to the topping concrete.*

Figure 20 *– Core removed from the fifth floor corridor.*

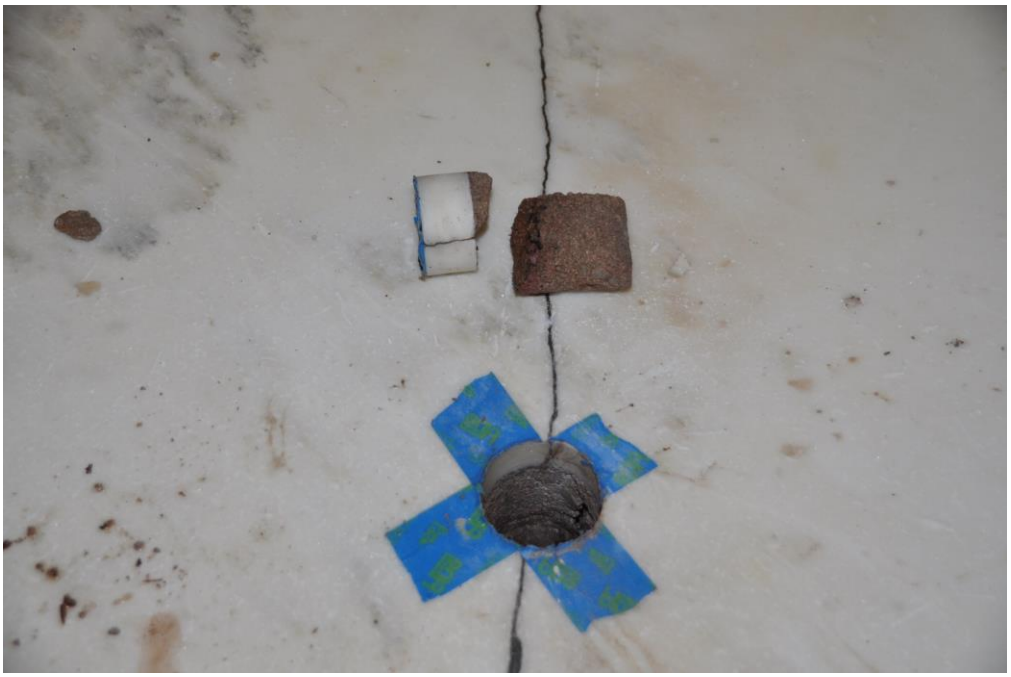

Figure 21 *– The sample removed from the fifth floor corridor. A filler material was found within the structural concrete that appears to be an expansion joint.*

Figure 22 *– Cracks in the precast plaster that is being crushed between the clay tile directly below it and the concrete structural beam directly above it.*

Figure 23 *– Removal of paint on the fifth floor pier capitals.*

Appendices

PROSOCO®

Consolideck®

CONCRETE FLOORING PRODUCTS

Cure & Seal Remover

Easy-to-use Consolideck® Cure & Seal Remover preps concrete floors and exterior flatwork for hardening and densifying or other penetrating protective treatments, as well as grinding, polishing and staining.

Cure & Seal Remover quickly removes the toughest high-solids cure and seals from floors, patios, driveways and other concrete flatwork. That leaves the concrete free of old coatings that can block treatments from penetrating, or clog up the heads on grinding and polishing equipment.

Cure & Seal Remover is water-rinsable and fully complies with all known VOC (volatile organic compound) regulations.

SAFETY INFORMATION

Always read full label and SDS for precautionary instructions before use. Use appropriate safety equipment and job site controls during application and handling.

24-Hour Emergency Information:
INFOTRAC at 800-535-5053

REGULATORY COMPLIANCE

VOC Compliance

Consolideck® Cure & Seal Remover is compliant with all national, state and district VOC regulations.

ADVANTAGES

- **Removes high-solids cure & seals from concrete flatwork.**
- **Works quickly.**
- **Does not affect concrete color.**
- **Contains readily biodegradable materials.**

Limitations

- Surfaces are slippery during application. Use appropriate caution.
- Product efficiency is reduced in cold temperatures.
- May damage synthetic or reflective glass.

TYPICAL TECHNICAL DATA

FORM	Clear, colorless liquid Sweet almond odor
SPECIFIC GRAVITY	1.04
pH	not applicable
WT/GAL	8.60 lbs
ACTIVE CONTENT	not applicable
TOTAL SOLIDS	not applicable
VOC CONTENT	30% maximum
FLASH POINT	198° F (92° C) ASTM D 3278
FREEZE POINT	not applicable
SHELF LIFE	2 years in tightly sealed, unopened container

PREPARATION

Protect people, vehicles, property, painted surfaces, plants and all surfaces not set for cleaning from product, splash and wind drift. Protect and/or divert pedestrian and auto traffic.

Some metal finishes and glass installed in recent years may be damaged by product. Test or protect if needed. PROSOCO's Sure Klean® Strippable Masking is not appropriate for use with this product.

Surface and Air Temperatures

Cleaning effectiveness is reduced when surface and air temperatures fall below 50°F (10°C).

Do not apply at temperatures below 40°F (4°C). If freezing conditions exist prior to application, let concrete thaw.

Equipment

Apply with a long-handled brush or mop and pump-up sprayer. Use a brush or scrubbing machine for light scrubbing. Use a mop or wet-vac as needed to take up the spent cleaner and debonded coating.

Pressure-wash under 1,000 psi, or mop with fresh water, only if needed to remove excess residue.

Storage and Handling

Store in a cool, dry place away from other chemicals. Keep tightly closed when not dispensing. Do not alter or mix with other chemicals. Published shelf life assumes upright storage of factory sealed containers in a dry place. Maintain temperatures of 45–100°F (7–38°C). Do not double stack pallets. Dispose of unused product and container in accordance with local, state and federal regulations.

APPLICATION

Read "Preparation" and the Safety Data Sheet before use.

ALWAYS TEST a small area of each surface to confirm suitability, coverage rate and desired results before beginning overall application. Test with the same equipment, recommended surface preparation and application procedures planned for general application. Let surface dry thoroughly before inspection.

Dilution & Mixing

Apply as packaged. Do not dilute or alter.

Typical Coverage Rates

Coverage varies based on concrete porosity and texture. Always test.

- 300–500 square feet per gallon
- 28–46 square meters per gallon

Application Instructions

1. Apply with low-pressure spray to dry surface.
2. Allow to dwell for 5–10 minutes.
3. Scrub with a stiff bristle brush or a mechanical scrub machine.
4. Take up as much spent cleaner and dissolved coating as possible.
5. Rinse or mop the floor with fresh water if needed.

Cleanup

Clean tools and equipment with fresh water.

BEST PRACTICES

Allow more dwell time for Cure & Seal Remover in temperatures below 50°F (10°C). In rare instances where floors are exposed to freezing temperatures, make sure the concrete is thawed out and surface temperature is above 40°F (4°C).

Make sure cleaned floors are as free as possible of spent cleaner and debonded coatings. A thorough mop, wet-vac or machine scrub usually gets up enough residue so the cleaned floor can be treated, once dry.

Some metal finishes and glass installed in recent years may be damaged by product. Test or protect if needed.

Surfaces are slippery during application. Use appropriate caution.

If needed, mop or pressure-rinse the cleaned floor with fresh water to flush away excess.

To remove permanent floor coatings such as urethanes and epoxies, test PROSOCO's Enviro Klean® SafStrip.

Never go it alone. If you have problems or questions, contact your local PROSOCO distributor or field representative. Or call PROSOCO technical Customer Care, toll-free, at 800-255-4255.

WARRANTY

The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchasers shall make their own tests to determine the suitability of such products for a particular purpose.

PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose**. The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose. PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

CUSTOMER CARE

Factory personnel are available for product, environment and job-safety assistance with no obligation. Call 800-255-4255 and ask for Customer Care – technical support.

Factory-trained representatives are established in principal cities throughout the continental United States. Call Customer Care at 800-255-4255, or visit our web site at www.prosoco.com, for the name of the PROSOCO representative in your area.

CONSOLIDECK®
HIGH PERFORMANCE CONCRETE

Oil & Grease Stain Remover

poultice cleaner for embedded oil & grease stains

OVERVIEW

Consolideck® Oil & Grease Stain Remover is a poultice cleaner for pulling stubborn oil and grease stains out of concrete. Just pour Oil & Grease Stain Remover on the embedded stain. It spreads out to make an instant poultice – no mixing, troweling, plastic covering or tape needed.

As the poultice dries, it pulls the contaminants out of the substrate, capturing them in its highly absorbent blend of batter-thick surfactants, solvents and powders. After a 5–8 hour dwell, simply sweep up the dried poultice and its absorbed contaminants for easy disposal.

SPECIFICATIONS

For all PROSOCO product specifications visit www.prosoco.com and click on "SpecBuilder" or "Solution Finder."

ADVANTAGES

- Works on old, deeply set stains.
- Easy to use. No mixing or scrubbing needed.
- Works on concrete.
- Leaves no residue.
- Removes motor oil, brake and power-steering fluids, anti-freeze, hydraulic fluids, cooking oils, food grease and other oil-based stains.
- Will not discolor concrete.

REGULATORY COMPLIANCE

VOC Compliance

Consolideck® Oil & Grease Stain Remover is compliant with all national, state and district VOC regulations.

TYPICAL TECHNICAL DATA

FORM	viscous, white liquid, slight citrus odor
SPECIFIC GRAVITY	0.80
pH	10.5
WT/GAL	6.66 lbs
ACTIVE CONTENT	Not applicable
TOTAL SOLIDS	Not applicable
VOC CONTENT	4% maximum
FLASH POINT	>200°F (>93°C) ASTM D 3278
FREEZE POINT	32°F (0°C)
SHELF LIFE	2 years in tightly-sealed, unopened container

Oil & Grease Stain Remover

PREPARATION

Protect people, vehicles, plants, nearby property and non-masonry surfaces from contact with product. Test all surfaces that may come in contact for compatibility. Immediately rinse non-target materials with water.

Surface & Air Temperatures

Best air and surface temperatures for cleaning are 50°F (10°C) or above. If freezing conditions exist before application, let substrate thaw.

Equipment

Use broom or other stiff-bristled brush, and dustpan to sweep up dried poultice. Though not required, high-pressure air can be used to "blow-out" extremely porous surfaces after sweeping.

Storage & Handling

Store in a cool, dry place. Keep container tightly closed when not dispensing. Do not alter or mix with other chemicals. Published shelf life assumes upright storage of factory-sealed containers in a dry place. Maintain temperatures of 45–100°F (7–38°C). Do not double stack pallets. Dispose of unused product and container in accordance with local, state and federal regulations.

APPLICATION

Before use, read "Preparation" and "Safety Information."

ALWAYS TEST each type of surface and each type of stain for suitability, dwell-time and results. Use the following application instructions.

Dilution

Use in concentrate. Do not dilute.

Typical Coverage Rates

Coverage rate will vary with concrete quality and porosity.

- One quart cleans approximately 6 sq.ft. (0.5 sq.m.)
- One gallon cleans approximately 24 sq.ft. (2 sq.m.)

Application Instructions

1. Scrape debris and buildup from surface. Do not pre-wet.
2. Shake well. Pour onto the oil-stained surface until the stain is completely covered. The batter-thick poultice will automatically reach its required thickness as it spreads out across the stain.
3. Let the poultice dry for 5–8 hours or overnight. Protect from pedestrian traffic and rain during dwell period. Regarding rain protection, a plastic "tent" over the poultice will allow proper drying. Avoid using tightly adhered plastic covers.

   Dry times may vary with environmental conditions such as temperature, wind and humidity. The poultice surface develops cracks as it contracts and dries. A fully developed network of cracks indicates the poultice is completely dry.
4. Sweep up the dry powder and dispose. On porous substrates, pressure water rinsing may facilitate removal of poultice dust.

Most oil and grease stains can be cleaned with one application. Severe, deeply embedded stains may redevelop after cleaning, requiring further applications.

Cleanup

Brush out brooms and wipe down dustpans with a damp cloth. High-pressure air may also be used to remove dust residues from brooms, brushes and dustpans.

ALWAYS TEST

ALWAYS TEST a small area of each surface to confirm suitability and desired results before starting overall application. Test with the same equipment, recommended surface preparation and application procedures planned for general application.

Oil & Grease Stain Remover

SAFETY INFORMATION

Consolideck® Oil & Grease Stain Remover is a thickened silica/surfactant blend. Use appropriate safety equipment and job site controls during application and handling. Read full label and MSDS for precautionary instructions before use.

First Aid

Ingestion: Do not induce vomiting. If conscious, give large amounts of water and call a physician, emergency room or poison control center immediately.

Eye Contact: Rinse thoroughly for 15 minutes. Get medical attention.

Skin Contact: Rinse thoroughly. Get medical attention if irritation persists.

Inhalation: Remove to fresh air. Get medical attention as necessary.

24-Hour Emergency Information:
INFOTRAC at 800-535-5053

WARRANTY

The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchasers shall make their own tests to determine the suitability of such products for a particular purpose.

PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose**. The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose. PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

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BEST PRACTICES

Always apply to a dry surface. Do not pre-wet. Blot up as much oil as possible on fresh spills

Mechanically remove as much dirt and debris as possible before application.

Pour Oil & Grease Stain Remover so that it exceeds the boundaries of the stain by at least one inch.

After sweeping up powder, hose off or pressure-wash cleaned surface to remove any leftover powdery residue.

Monitor cleaned area for reoccurrence of stain. Some deeply penetrated stains may continue rising to the surface through the concrete pores and capillaries following cleaning. If stains reoccur, reapply Oil & Grease Stain Remover.

Never go it alone. If you have problems or questions, contact your local PROSOCO distributor or field representative. Or call PROSOCO technical Customer Care, toll-free, at 800-255-4255.

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