

# City of Newton

City Hall War Memorial Portico  
Newton Cemetery Civil War Memorial

Newton, Massachusetts

## **Exterior Masonry Cleaning Testing and Recommendations**

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**BCA**



## **CITY OF NEWTON, MASSACHUSETTS**

Newton City Hall War Memorial, Portico and Steps  
Newton Cemetery, Civil War Memorial

## **EXTERIOR MASONRY CLEANING TESTS**

### **INTRODUCTION**

Newton City Hall War Memorial (portico and stairs), located in Newton, Massachusetts, is faced with limestone and brick, with granite steps. The Civil War Memorial, located in the Newton Cemetery, is a hillside tomb (no interments) and is built of granite with white marble inset tablets. Building Conservation Associates, Inc., (BCA) carried out cleaning tests at both locations to determine the most effective and least destructive methods for cleaning these exterior masonry surfaces, with the understanding that the intention is not to achieve a "like new" appearance, but a condition by which a general removal of soiling will decelerate deterioration.

### **CLEANING TESTS: Newton City Hall War Memorial, Portico and Steps**

Cleaning tests were conducted in June 2006, on the north facing side of the stairs, an area of heavy biological growth and staining. A second area was chosen for testing; the horizontal surface of the north pier at the base of the steps, as it is very heavily stained with black biota. Four cleaners were chosen for testing, based on the criteria of removing the heaviest soiling. Individual results are presented in the attached chart. A "control" test panel was also produced at both locations, using water wash alone, in order to gauge the actual effectiveness of the cleaners themselves. Test surfaces were prewet prior to product application unless otherwise directed by the manufacturer. Products were applied with a stiff bristle brush and agitated. Dwell time for each cleaner was based on recommendations of the manufacturer. Test areas were then rinsed with a 500 psi cold pressure wash.

Klenztone #1, undiluted, produced the most impressive cleaning results at both locations, with no apparent burning of the brick, limestone or granite. Results produced a cleaned, but not overcleaned, surface and also removed biological and deep-seated staining. Other products were dismissed because of inferior cleaning, labor intensity or multi-stepped application.

## **CLEANING TESTS: Newton Cemetery, Civil War Memorial**

Cleaning tests were conducted in June 2006 and September 2006, at the base of the Memorial, including both the marble and granite. Four cleaners were chosen for testing, based on their projected appropriateness on the material. Individual results are presented in the attached chart. A "control" test panel was also produced using water wash alone, in order to gauge the actual effectiveness of the cleaners themselves. Test surfaces were prewet prior to product application unless otherwise directed by the manufacturer. Products were applied with a stiff bristle brush and agitated. Dwell time for each cleaner was based on recommendations of the manufacturer. Test areas were then rinsed with a 500 psi cold pressure wash, powered by a gas generator.

Klenztone #2 produced the best results on the granite, however the effectiveness of the cleaners tested were not satisfactory on the marble. The white marble has not only very heavy biological growth at the surface, but much deeper staining that goes well beyond the surface of the stone. A general cleaner will not be effective on this level of staining. Therefore, five additional cleaners, four of which were poultices, were applied on the previously cleaned areas of the marble. Poultices, which are cleaners mixed with inert material that then becomes clay-like in consistency, allows a cleaner to remain on a surface for much longer periods of time. The poultices were left on the marble for 26 hours, while the last cleaner was left to dwell for four hours. Individual results are presented in the attached chart.

The Sodium Hypochlorite poultice produced the most impressive result by far, removing nearly all biological staining as well as improving the brightness of the marble with no apparent burning of marble. The other samples produced moderate to poor results.

## **RECOMMENDATIONS**

### **Newton City Hall: War Memorial Portico and Steps**

As demonstrated in the attached chart and photographs, Klenztone #1, manufactured by K & E Chemical, Inc., was most effective in removing both general to moderate soiling, biological growth and staining.

The presence of heavy soiling, biological growth and staining on the masonry is the primary cause of masonry deterioration, as it traps and holds moisture against the surface. For this reason, it is recommended that the cleaning of the War Memorial Portico and Steps be executed, in order to inhibit further deterioration by extending the life not only of the masonry, but the cleaning campaign as well. As there is to be partial repointing of the Memorial as well, it particularly important to clean the masonry prior to repointing and repair work, as cleaning can often identify areas of mortar that are in a state of deterioration.

## **Newton Cemetery: Civil War Memorial**

As demonstrated in the attached chart and photographs, general cleaning of both the marble and granite was most effective with Klenztone #2, manufactured by K & E Chemical, Inc. As general cleaning did not sufficiently remove deep biological staining of the marble, it is recommended that the marble surfaces receive a poultice application of Sodium Hypochlorite, following the application method in the attached chart.

Because the Civil War Memorial is to be dismantled and rebuilt, it is recommended that all masonry cleaning take place following disassembly and prior to reassembly. The marble panels should be laid horizontally to more easily and effectively apply the poultice.

### **GENERAL COMMENTS**

Toxicity and acidity of recommended products requires protection of all other building elements such as windows, doors, grills, hardware, and any other non-masonry surface. Great care must also be taken in protection of adjacent grounds, as well as appropriate precautions taken by the operator.

Prior to proceeding with general cleaning, the masonry cleaning contractor should prepare a test panel following the recommended cleaning procedures. This panel should be approved by the Project Architect and the Restoration Consultant. The approved sample should remain in place for the duration of the contract to provide the standard for determining acceptable levels of cleaning.

See Test Panel photos on the following page. Cleaning Charts are also attached.



*Newton Cemetery Civil War Memorial* : Heavy biologic soiling. From left to right: Light Duty Restoration Cleaner, Klenztone #2 (best result), Bac2Nu, Diedrich 910 Marble Cleaner.



*Newton Cemetery Civil War Memorial* : Poultice Application.



*Newton City Hall War Memorial : Sample #3, Klenztone #1*



*Newton City Hall War Memorial : Sample #3-A, Klenztone #1*



***Newton City Hall War Memorial*** : Limestone and granite in testing area. From left to right: Powerwash with water, Bac2Nu, Klenztone #1 (best result), Light Duty Restoration Cleaner.



***Newton City Hall War Memorial*** : North pier at steps. Heavy biologic soiling. From left to right: Powerwash with water, Bac2Nu, Klenztone #1 (best result).





***Newton Cemetery Civil War Memorial*** : From left to right: Prosoco 1260 , Sodium Hypochlorite (best result), T-1087, Hydrogen Peroxide, Prosoco 942 (not pictured here).



***Newton Cemetery Civil War Memorial*** : Sodium Hypochlorite Results.

No.	Product	Manufacturer	Concentration / Mix	Application Technique	Dwell Time	Results
1	Pressurized Water			Approximately 500 psi pressure wash		Somewhat clean; biological growth was not removed from the granite sufficiently.
2	Bac2Nu	Chemique, Inc. 315 N. Washington Ave. Moorestown, NJ 08057 856.273.0917 chemique.com	Undiluted	Prewet surface with clean water; apply detergent with soft-bristle brush; agitate; rinse with 500 psi pressure wash.	5 minutes with agitation	Somewhat cleaner than water wash; granite cleaned well; not effective on deep staining.
3	Klenztone #1	K&E Chemical Co., Inc. 3960 East 93rd St. Cleveland, OH 44105 800.331.1696 klenztone.com	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash	5 minutes with agitation	Impressive results; limestone, granite, and the limestone mortar joint cleaned very well and also removed deep staining.
3-A	Klenztone #1	K&E Chemical Co., Inc. 3960 East 93rd St. Cleveland, OH 44105 800.331.1696 klenztone.com	Undiluted		5 minutes with agitation	Product same as above; this application included testing on brick. Also very impressive results.
4	ProsoCo Light Duty Restoration Cleaner	ProSoCo, Inc. 3741 Greenway Circle Lawrence, KS 66046 800-255-4255	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash	15 minutes with agitation	Cleaned moderately well, however did not remove deep staining as well as samples 3 and 3-A.
5	Water			Approximately 500 psi pressure wash		Removed only surface dirt.
6	Bac2Nu	Chemique, Inc. 315 N. Washington Ave. Moorestown, NJ 08057 856.273.0917 chemique.com	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash	5 minutes with agitation	Removed surface dirt and most of the black biological staining.
7	Klenztone #1	K&E Chemical Co., Inc. 3960 East 93rd St. Cleveland, OH 44105 800.331.1696 klenztone.com	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash; repeat second application	5 minutes with agitation	Removed surface dirt and most of the black biological staining, somewhat better than sample 6.

No.	Product	Manufacturer	Concentration / Mix	Application Technique	Dwell Time	Results
1	Pressurized Water			Approximately 500 psi pressure wash		Removed surface dirt only
2	Prosoco Light Duty Restoration Cleaner	ProSoCo, Inc. 3741 Greenway Circle Lawrence, KS 66046 800-255-4255	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash; repeat second application	15 minutes with agitation	Removed surface dirt and a small amount of the surface biological growth on marble. Did not remove any deep biological staining. Granite cleaned well.
3	Klenztone #2	K&E Chemical Co., Inc. 3960 East 93rd St. Cleveland, OH 44105 800.331.1696 klenztone.com	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash; repeat second application	5 minutes with agitation	Removed surface dirt and most of the surface biological growth on marble. Did not remove any deep biological staining. Granite cleaned very well.
4	Bac2Nu	Chemique, Inc. 315 N. Washington Ave. Moorestown, NJ 08057 856.273.0917 chemique.com	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash; repeat second application	5 minutes with agitation	Removed surface dirt and most of the surface biological growth on marble. Did not remove any deep biological staining. Granite cleaned well.
5	Diedrich 910 Marble Cleaner	Diedrich Technologies Inc. 7373 S. 6th Street Oak Creek, WI 53154 800.323.3565	Undiluted	Prewet surface with clean water; apply detergent with stiff-bristle brush; agitate 2x during dwell; rinse with 500 psi pressure wash; repeat second application	2-3 minutes with agitation	Removed surface dirt and a small amount of the surface biological growth on marble. Did not remove any deep biological staining. Granite cleaned only moderately well.

No.	Product	Manufacturer	Concentration / Mix	Application Technique	Dwell Time	Results
1	Prosoco 1260 Limestone and Marble Poultice	ProSoCo, Inc. 3741 Greenway Circle Lawrence, KS 66046 800-255-4255	Full Strength; premixed poultice	Poultice applied with a plastic scraper and secured with plastic wrap and painters tape. After dwell time, remove with a plastic scraper and rinsed with water (not power washed, rinsed with a garden hose)	26 hours	Ineffective; only slightly cleaner
2	Sodium Hypochlorite (4-6% NaOCl)	Fisher Scientific 800.766.7000 fishersci.com	Undiluted; mixed with Prosoco Poultice Powder	Poultice applied with a plastic scraper and secured with plastic wrap and painters tape. After dwell time, remove with a plastic scraper and rinsed with water (not power washed, rinsed with a garden hose)	26 hours	Very effective; removed all biological staining
3	Prosoco T-1087 Special Poultice Additive	ProSoCo, Inc. 3741 Greenway Circle Lawrence, KS 66046 800-255-4255	Undiluted; mixed with Prosoco Poultice Powder	Poultice applied with a plastic scraper and secured with plastic wrap and painters tape. After dwell time, remove with a plastic scraper and rinsed with water (not power washed, rinsed with a garden hose)	26 hours	Ineffective; only slightly cleaner
4	Hydrogen Peroxide 30%	Fisher Scientific 800.766.7000 fishersci.com	Undiluted; mixed with Prosoco Poultice Powder	Poultice applied with a plastic scraper and secured with plastic wrap and painters tape. After dwell time, remove with a plastic scraper and rinsed with water (not power washed, rinsed with a garden hose)	26 hours	More effective; partially removed biological staining
5	Prosoco 942	ProSoCo, Inc. 3741 Greenway Circle Lawrence, KS 66046 800-255-4255	Undiluted	Gel applied with a plastic scraper and secured with plastic wrap and painters tape. After dwell time, remove with a plastic scraper and rinsed with water (not power washed, rinsed with a garden hose)	4 hours	Ineffective; only slightly cleaner