APPENDIX B: PERFORMANCE STANDARDS

Requirements and Performance Standards
Cleaning Masonry Exteriors

I. Requirements

General: All work related to historic buildings shall comply with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Treatment approaches will be in the "gentlest means possible," and all methods should be material and building specific. Programs for the cleaning of historic building façades shall be developed on a case-by-case basis with regard to each building and all associated building materials. Harsh treatments and inappropriate cleaning methods, including abrasive cleaning and certain chemical applications, can damage significant historic building fabric and character-defining features. Traditional abrasive applications such as "sand-blasting" and high-pressure water cleaning shall not de used.

II. Performance Standards

Qualified Contractor(s)/Consultant(s): A qualified professional such as a historic preservation or building conservation expert shall be consulted to develop an appropriate cleaning program for each building and to direct the work. A qualified contractor experienced in the cleaning of historic buildings shall perform the work.

Testing: Prior to cleaning a building, the source and type of soiling, dust, dirt, or debris shall be professionally tested. Identification of the type of soiling material, the type of building material (e.g. stone, cast stone, brick, terra cotta) combined with professional interpretation of test results will aid in the determination of the most appropriate cleaning method for a building. After a cleaning program is selected, the method shall be tested and evaluated by a professional prior to widespread application.

WTC Site Specific Considerations:

- It should be noted that post disaster cleaning of particulate soil and dust generated by the event should not be confused with cleaning of more persistent long term soiling that would require more aggressive methods.

- It is possible, based upon composition of the particulates generated by the event, that the dust and/or debris on the façade may chemically react with applications and masonry substrate during the cleaning process, creating deposits that will cause problems to the building over time and that will be difficult to remove from building fabric. Dust and debris deposited on buildings should be tested for composition. If it is determined that a chemical reaction is possible, steps shall be taken to properly remove debris (from the projecting ledges or elements, sills, fire escapes) and dust from the horizontal and vertical surfaces of the building prior to the application of water or liquid cleaning agents. This may include vacuuming and/or gently brushing away dust from all horizontal and vertical

exterior surfaces. Dust that has re-calcified, or hardened on surfaces should be carefully removed under the direction of a conservator or preservation professional so that historic fabric is not damaged. Debris and dust should be properly disposed of.

- The owner should insure that potential disaster related damages to the to the building (which may include, but are not limited to, openings in building facades and roofs, cracks, open mortar joints, and weakened or damaged materials) are identified by a qualified professional prior to cleaning the facade. Precautions should be taken prior to cleaning applications, as dust or cleaning agents may enter the building through openings in the façade or fabric.

Cleaning Methods: (See WTC Site Specific Considerations First)

Based on building materials and overall building condition one of the following methods of cleaning will most likely be used:

Water Cleaning- Water cleaning utilizes the application of a gentle, low pressure, clean water spray. High-pressure water spray should not be used and can cause significant damage to building materials. Applied water pressures should not exceed 250 psi, but it must be noted that even low or moderate pressure water applications (100-400 psi) can damage some masonry. Prolonged application of water to a building can result in staining caused by the leaching out of minerals within the building material, the corrosion of embedded ferrous metals, and damage finishes on the interior of the building. Water cleaning should not be conducted during cold weather, as freeze/thaw cycles may cause damage to facades.

Chemical Cleaning- Chemical cleaning may be utilized alone or in conjunction with a water cleaning. Water cleaning may be accompanied by the use of a nonionic detergent applied with fiber brushes and followed with subsequent water applications as specified in the determined cleaning program. The use of acidic or alkaline chemicals for cleaning can cause damage to building materials as well as pose health, safety, and environmental risks. Cleaning poultices are composed of absorbent powders mixed with a liquid to create a wet paste that can be applied to a building. Poultices allow controlled application and removal and minimize rinsing requirements.

Abrasive Cleaning- Abrasive cleaning involves mechanically abrading a surface to remove soiling. **Traditional abrasive cleaning techniques are not suitable for cleaning historic buildings as building materials can easily be damaged.**

Acceptable and gentle abrasive cleaning methods are highly sophisticated. Consult Historic Building Facades: The Manual for Maintenance and Rehabilitation published by New York Landmarks Conservancy for information regarding acceptable methods of abrasive cleaning.

Cleaning Methods and Materials: The identification of type of soiling, dust, dirt, or debris and specific building materials (e.g. stone, cast stone, concrete, brick, terra cotta) is necessary in order to determine appropriate building cleaning programs.

Stone- Gentle water cleaning, and gentle water cleaning with a detergent, is appropriate. Mild acidic and alkaline chemical cleaning can be carefully considered for use based on material appropriateness if detergents are not effective. Air abrasive cleaning can be appropriate if abrasive grit types are carefully considered and tested.

Cast Stone- Gentle water cleaning and gentle water cleaning with a detergent is appropriate.

Brick- Gentle water cleaning, and gentle water cleaning with a detergent, is appropriate. Acidic and alkaline chemical cleaning can be considered for cleaning unglazed brick when detergents are not effective. Acidic and strong alkaline chemical cleaning solutions should not be used on glazed brick. Abrasive cleaning can potentially damage brick surfaces.

Terra Cotta- Terra cotta should not be abrasively cleaned, or cleaned with acidic or strong alkaline cleaning solutions as these methods can damage glazes. Water cleaning, or water cleaning in combination with a detergent, is appropriate.

Health, Safety, and Environmental Issues:

It is the responsibility of the Applicant to obtain all local, federal and state permits prior to the commencement of work and adhere to all local, state and federal laws with respect to the application and disposal of potential hazardous waste materials.

Sources:

AIC Ethics and Standards Committee. "AIC Code of Ethics and Guidelines for Practice." Revised August, 1994.

Grimmer, Anne E. "Dangers of Abrasive Cleaning to Historic Buildings." Preservation Brief Number 6. Washington, DC: National Park Service, 1979.

New York Landmarks Conservancy. *Historic Building Facades: The Manual for Maintenance and Rehabilitation*. New York: John Wiley & Sons, Inc., 1997.

Weaver, Martin E. "Removing Graffiti from Historic Masonry." Preservation Brief Number 38. Washington, DC: National Park Service, 1995.

Note: National Park Service Preservation Briefs, including those references in these performance standards, are available on the Internet; Keyword Preservation Briefs.

Requirements and Performance Standards
Removing Applied Paint (Signage) from Masonry

I. Requirements

General: All work related to historic buildings shall comply with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Treatment approaches will be in the "gentlest means possible," and all methods should be material and building specific. Removal of Applied Paint (signage) from masonry should be done as soon as possible. Programs for the removal of applied paint from historic building fabric shall be developed on a case-by-case basis with regard to each building and all associated building materials. Harsh treatments and inappropriate cleaning methods, including abrasive cleaning and certain chemical applications, can permanently damage significant historic building fabric and character-defining features. Traditional abrasive applications such as "sand-blasting" and high-pressure water cleaning shall not de used.

II. Performance Standards

Qualified Contractor(s)/Consultant(s): A qualified professional such as a historic preservation or a building conservation expert shall be consulted to develop an appropriate removal program for each building. A qualified contractor or building conservator, experienced in the removal of applied paint (signage) and cleaning of historic buildings shall be used to perform work.

Testing: Prior to the removal of applied paint, identify the paint type and the substrate to which the paint is applied. Identification of the paint type and substrate material (e.g. stone, cast stone, brick, terra cotta) combined with professional interpretation of test results will aid in the determination of the most appropriate removal method. After a cleaning program is selected, the method shall be tested and evaluated by a qualified professional prior to application. Each building and building material shall be assessed and tested prior to developing and implementing cleaning programs. It is expected that several methods of removal will be tested before an appropriate removal method is found.

WTC Site Specific Considerations:

- Masonry surfaces shall be free of dust prior to implementing a removal program. It is possible, based upon composition of the particulates generated by the disaster, that the dust and/or debris on the façade may chemically react with applications and masonry substrate during the cleaning process, creating deposits that will cause problems to the building over time. Dust and debris deposited on buildings should be tested and, if determined necessary, properly removed prior to the application of water or liquid cleaning agents. (see Performance Standards for Cleaning Masonry Exteriors).

- The Applicant should ensure that potential disaster related damages to the building which may include, but are not limited to, openings in building facades, dust on building materials, cracks, open mortar joints, and weakened or damaged materials are identified by a qualified professional prior to cleaning the facade. Precautions should be taken prior

to applications as dust or cleaning agents may enter building through openings in facades or fabric.

Cleaning Methods: The intent of these standards is to provide general guidelines for the removal of applied paint (or signage) from historic building exteriors that comply with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. As mentioned above, masonry surfaces should be free of dust prior to implementing a removal program ***(see Performance Standards for Cleaning Masonry Exteriors).***

The following information is explained in greater detail in Preservation Brief Number 38 "Cleaning Graffiti from Historic Masonry" by Martin E. Weaver:

Substrate Identification- Identification of the type of stone substrate will help determine the type of removal methods. Masonry materials can be categorized as being acid-sensitive, non-acid sensitive, or alkali-sensitive. The application of inappropriate paint removers or cleaning agents can damage stone. Acid-sensitive materials include, but are not limited to: limestone, marble, travertine, calcareous sandstones and shales; most polished stones; and glazed architectural terra cotta and brick. Non-acid sensitive materials include, but are not limited to: slate, granite, unglazed architectural terra cotta and unglazed brick. Alkali-sensitive materials include, but are not limited to: glazed brick, glazed terra cotta, some granites, Indiana limestone, and many types of sandstone. Strong acids and strong alkalis can damage glazed and polished surfaces.

Removal with Water and Detergent- Water cleaning utilizes the application of a gentle, low-pressure, clean water spray. Water alone can sometimes remove paint. If the application of low-pressure water is not successful in removing the applied paint, a neutral non-ionic detergent may be used in conjunction with a water application. Any detergent being used should first be tested in a small inconspicuous area prior to widespread application. The pressure of water applied to a masonry surface should be carefully monitored (see "Abrasive Removal"). Inappropriate detergents can cause permanent staining and damage to substrates.

Removal using Poultices- Poultices are powdered materials (e.g. clay, paper, cellulose products, fuller's earth) that are mixed with water or a cleaning agent to form a paste that can be applied to a building surface. Poultices are often the most effective means of removing applied paint (signage) from masonry as they allow the cleaning solution to remain in place as long as possible, and draw out the staining material from the masonry. An experienced and qualified professional should apply poultices as improper application can sometimes draw out and redeposit stains on the opposite face of masonry surfaces. Any cleaning application should be tested in an inconspicuous area or on mock-ups prior to widespread application.

Removal utilizing Alkaline Compounds- Alkaline compounds are typically used in poultices in the form of liquids (reagents), applied to markings/stains on non-alkali sensitive masonry. The application of alkaline compounds should be followed by a weak acid wash and a water

wash in order to remove all of the remaining alkaline substance from the substrate in order to avoid burning or staining the historic fabric. The utilization of strong alkalis, with a pH 13-14, including sodium hydroxide-based paint removers, should be avoided as their application can result in efflorescence or staining of the surface of masonry if not fully neutralized after application and removal. Hydroxide paint removers, including potassium, can adversely react with ferrous elements found in certain stones (e.g. Indiana limestone) and cause subsequent staining. Masonry surfaces should be tested with non-staining ph strips after removals are completed in order to ensure that the substrate has been adequately neutralized.

Removal utilizing Bleaches- Certain alkali-based bleaches, calcium hypochlorite for example, are sometimes used in poultices. When stains are not easily removable, bleaching may reduce the appearance of a stain.

Organic Solvents and Paint Removers- Chemical cleaning may be utilized alone or in conjunction with a poultice. Organic solvents are sometimes used in the form of a paste or a gel that will hold the solvent in place. The use of acidic or alkaline chemicals for cleaning can cause damage to building materials as well as pose health, safety, and environmental risks. Any cleaning application should be applied by a qualified professional and tested in an inconspicuous area or on mock-ups prior to widespread application. "Off the shelf" graffiti removers should be avoided as their application in conjunction with scrubbing often results in the running or redistributing of a paint or stain on the surface of the historic fabric. Masonry surfaces should be tested with non-staining ph strips after removals are completed in order to ensure that the substrate has been adequately neutralized. Areas that are not being treated for the removal of applied paint (signage) should be appropriately masked and protected.

Abrasive Removal- Abrasive cleaning involves mechanically abrading a surface to remove staining. Traditional abrasive cleaning techniques, such as "sand-blasting" and high pressure water applications, are not suitable for cleaning historic buildings as older building materials can easily be damaged. Low or medium water pressure washing (100-400 psi) can damage historic masonry. An acceptable form of micro-abrasion (involving fine abrasive materials applied at pressures of 35-40 psi) used to mechanically remove markings from historic masonry should be carefully considered and implemented only by skilled workers under the direction of a building conservator or preservation professional. Abrasive cleaning should not be used on brick or glazed or polished surfaces.

Other Removal Methods- Removal methods such as laser cleaning have been recently developed. Experienced building conservators and/or preservation professionals should implement a removal program including a method such as laser cleaning.

Cleaning Considerations: Buildings are frequently composed of several different masonry materials. Each material must be determined, evaluated, and tested by an experienced conservation or preservation specialist prior to implementing a cleaning system.

A cleaning system appropriate for a specific masonry material may not be appropriate for adjacent masonry mortar joints. The removal of paint/stain on mortar joints should be avoided if possible.

Reducing the strength of the removal agent and/or the pressure applied for removing the paint/stain can minimize "clean spots" left on masonry.

Masonry surfaces should be tested with non-staining ph strips after removals are completed in order to ensure that the substrate has been adequately neutralized. Neutralizing a surface involves removing all chemical and/or cleaning agents from the fabric. A substrate that has not been neutralized can lead to subsequent damage of the historic fabric.

Applied Paint (Signage) to Significant Interior Historic Fabric: If paint (signage) is applied to significant interior fabric (e.g. murals, mosaics, decorative metals) an experienced architectural and/or art conservator should be consulted regarding any treatment or removal. It is possible to successfully remove applied overpaint from even the most decorative or fragile substrates.

Health, Safety, and Environmental Issues:

It is the responsibility of the Applicant to obtain all local, federal and state permits prior to the commencement of work and adhere to all local, state and federal laws with respect to the application and disposal of potential hazardous waste materials.

Sources:

AIC Ethics and Standards Committee. "AIC Code of Ethics and Guidelines for Practice." Revised August, 1994.

Grimmer, Anne E. "Dangers of Abrasive Cleaning to Historic Buildings." Preservation Brief Number 6. Washington, DC: National Park Service, 1979.

New York Landmarks Conservancy. *Historic Building Facades: The Manual for Maintenance and Rehabilitation*. New York: John Wiley & Sons, Inc., 1997.

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