Barnes & Cone
ARCHITECTURAL MASONRY

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GOOD MASONRY PRACTICES
INSTALLING CUSTOM CONCRETE BLOCK

MINIMIZE STAINING

➢Avoid excessive condensation in stretch wrapped block. Significant moisture can develop in cubes of stretch wrapped block in a relatively short period of time. Once the block become visibly wet from the trapped moisture, they will remain wet until the plastic is removed. This wet, unbreathable condition will often cause efflorescence. Minimize the time block are stored in stretch wrapped plastic. If condensation occurs, remove the wrap and protect block with a tarp.

➢When using Custom Concrete Block, be careful not to stain the exposed surface of the block with mortar or grout. The additional time it takes to keep the exposed surface clean, is an investment compared to the time it takes to clean the masonry later. Severe stains can not be cleaned without damaging the masonry appearance.

➢Wet cutting concrete block often leaves a white stain, which is the residual of the cement and aggregate. This cement slurry is very difficult to remove once it has dried and hardened. If you wet cut, thoroughly wash the cut unit immediately after removal from the saw. If you dry cut, it is equally critical to blow dust off the block. If this dust becomes wet, you again have cement slurry that when dry will be extremely hard to remove without damaging the masonry appearance.

Please be aware that most masonry products contain respirable crystalline quartz. Failure to follow an appropriate protection plan when sawing, grinding or blowing off dust, could be harmful to your health. OSHA has a Special Silica Protection Plan that outlines the minimum steps that should be taken. Information can be found on their website @ http://www.osha.gov

➢Cover the top of unfinished masonry work to protect it from the weather. Efflorescence will usually result when tops of walls are left open to moisture penetration.

➢Mortar joints for exterior masonry should be concave tooled. Raked, cut or brushed joints are poor weathering joints and invite water penetration and efflorescence.

➢If possible, avoid double stacking cubes of custom concrete block, when stocking the jobsite. Double stacking will result in greater jobsite chipping and creates the possibility of wood sap leeching out of the wooden pallet and staining the block below. The stain from wood sap is extremely difficult to remove from masonry.

RainBloc®

➢RainBloc® Mortar Admix directions should be followed closely to assure a properly functioning wall system:

ASTM C-270 PROPORTION SPECIFICATION
BASED ON 1 BAG =1 CUBIC FOOT

COMMON MIX DESIGNS

Mortar Type		Portland	Hydrated Lime	RainBloc® Mortar Admix	Mason Sand
Portland Cement and Lime	M	1 Bag	¼ Bag	32 oz.=1 quart bottle	Not Less Than 2 ¼ and not more than 3 times the sum of the separate volumes of cementitious materials
	S	1 Bag	½ Bag	32 oz.=1 quart bottle	
	N	1 Bag	1 Bag	32 oz.=1 quart bottle	
Masonry Cement Or Mortar Cement	M	1 Bag	– –	16 oz.=1/2 quart bottle	
	S	1 Bag	– –	16 oz.=1/2 quart bottle	
	N	1 Bag	– –	16 oz.=1/2 quart bottle	

Never use RainBloc® Mortar Admix if it has frozen.

When an accelerator is allowed by specifications, we recommend that only Intermix by ACM Chemistries be used with RainBloc® Mortar Admix. (also produced by ACM Chemistries) Otherwise, approval for chemical compatibility between RainBloc® Mortar Admix and a different chemical accelerator, should be made through the architect's office.

If you are using a prepackaged mortar mix such as Spec Mix, make certain no additives are blended into the Spec Mix, without the approval of the Architect. For example, compatibility would be a serious concern if the Spec Mix contained an integral water-repellent and RainBloc® Mortar Admix was added into the Spec Mix at the mixer.

COLOR CONSISTENCY

➢When using Barnes & Cone's Custom Mortar Color Batches, closely follow the directions printed onto every bag. Never use a portion of a bag (batch) for a reduced volume mix. Most batches contain three or four pigments. Once the batch is blended together in our lab, you can not successfully divide it into smaller, partial batch.

➢ To achieve consistent color, carefully measure the water and sand put into the mixer. Use the same volume batch to batch. Mason Sand should be protected on site to assure uniform water content. The relatively small inventories of sand found on a jobsite can become saturated with rain, resulting in significantly more water added to the mix through the sand.

➢Mixing time has a significant effect on the final color of the mortar. Materials should be added into the mixer in the same sequence batch to batch. Pigments should be mixed at a constant, specific time batch to batch. **After all materials** are in the mixer, they should be mixed for 3 to 5 minutes. However, once you determine the most effective mix time (within the 3 to 5 minutes) keep it the same batch to batch. Varying the mixing time of colored mortars, will develop the pigment inconsistently and create different colors . . even when everything else is the same!

➢Protect uncured mortar joints from rain or snow. Moisture striking an uncured mortar joint will turn the joint into a milky white color.

➢Tool mortar joints consistently, once the mortar has dried to a "thumb print hard" consistency (when a clear thumbprint can be impressed and the cement paste does not adhere to the thumb.) A mortar joint tooled early...when wet, will yield a brighter or lighter color. If the mortar becomes too stiff (dry) a darker joint will result. If the same mortar out of the same batch is tooled at all three levels of moisture . . wet, thumb print hard and dry . . .three different and distinct colors will result.

Cleaning Architectural Concrete Masonry Units

Keeping Masonry Clean During Construction, Will Yield The Best Results, In The Least Time, For The Lowest Cost!
Keep in mind that mortar stains will achieve strengths comparable to concrete slabs in 7 to 28 days. Cleaning masonry within 4 to 7 days from construction will minimize the need for aggressive cleaning methods to remove stains. Allowing masonry to remain uncleaned for extended periods of time increases the chances that stain removal will damage to walls. Cleaning masonry soon after construction will assist in making the cleaning process effective. **Cleaning of masonry is an action that requires the mason contractor to determine the optimal Means and Methods to achieve the desired results.** Cleaning methods should be demonstrated as safe and effective before proceeding to clean the completed work. The most effective way to demonstrate a safe and effective cleaning method is to perform that method on a sample panel, and receive approval from the designer and owner prior to cleaning the entire building with the approved method.

For a good overview of cleaning requirements- Please see the Concrete Products Design Note Video:
http://www.concreteproductsgroup.com/index.php/videos/item/cleaning-architectural-masonry-best-practices

Cleaning with water and a stiff brush is the safest method to assure that the cleaning process will not damage the masonry. Many times cleaning with water and a stiff brush is effective when the walls have been kept reasonably clean. In addition to cleaning with water and a stiff brush we have seen positive results using the cleaning procedures listed below. Each procedure is described briefly, followed by a list of the different types of Architectural CMU and the cleaning procedures that we have seen work successfully.

These descriptions are meant only as an overview as the entire process is not described in this document. For full descriptions of the specific processes we recommend completely reading and understanding the manufacturer's literature when using chemicals and the tool manufacturer's literature for pressure washing, abrasive blasting and diamond polishing. These cleaning procedures should only performed by an experienced mason contractor well versed in cleaning concrete masonry. Misapplication can result in permanent damage to the masonry.

Pressure Wash:
If specifications allow pressure washing, limit the size of the machine to 2,000 PSI. Use a wide flange tip. Never use a pointed tip. Keep the tip a minimum of 12" from the masonry surface. Direct the spray at a 45˚ angle onto the wall. Using a pointed tip or spraying closer than 12" away from the wall or spraying directly (perpendicular) at the wall, can remove cement paste from the masonry surface. The typical result is a series of swirling dark lines, mirroring the path the operator followed with the pressure wash wand. **This can be a permanent condition!**

Pressure washing can introduce a tremendous volume of water into the wall system. It is important that any water entering the wall system does not become trapped and that it is quickly removed through the flashing/weep system

and evaporation. Be extremely cautious pressure washing if the flashing /weep system has not been designed according to ACI 530 specifications: "Typically flashing is installed at all interruptions in the vertical plane of a masonry wall, such as tops of the foundation, above shelf angles, over openings, above bond beams, etc." If high volumes of water are pushed into the wall system by the pressure wash, and become trapped in the wall for a prolonged period of time . . . significant efflorescence will likely result.

Do not attempt to pressure wash unless several days of good drying conditions follow. Pressure washing during periods of lower temperatures or multiple days of rain, promotes efflorescence. The wall system will remain saturated allowing water-soluble salts to go into solution and be carried to the surface, as the moisture in the wall slowly evaporates.

Acid Detergents:

If specifications allow use of acid or acid detergents always begin with a small test area and secure approval from the Architect before proceeding. Acids or acid detergents are normally considered for concrete masonry, only if significant staining was allowed to occur.

Be very careful not to use acids or acid detergents in such a high concentration, that cement paste from the mortar and block is removed. Follow the manufacturer's directions paying particular attention to saturating the wall with water and the ratio of acid to water. Cement paste significantly influences the overall color of a masonry wall. If the mortar or cmu is pigmented, removal of cement paste will also change the ratio of cement to pigment and alter the color. When the mortar mix or block mix uses contrasting aggregates, removal of the cement paste will accent the contrast.

If the architect will accept a change in the color or texture of the mortar and cmu, the concern then becomes to uniformly remove the stain and cement paste, so that a consistent color is maintained. Cleaning is normally performed in sections and by scaffold lift. The first step is typically to saturate the wall with water. Because the water creates a uniform darkening effect, great care must be taken during the cleaning process to monitor the areas that have been acid washed and areas that have not. Overlapping sections or skipping over areas, will cause noticeable color changes in the wall. The cleaning crew must be careful to uniformly apply the same volume and concentration of acid. The acid should be left on the wall for the same duration of time. Otherwise, different amounts of cement paste will be removed from the mortar and block, causing a patchy variation in the color of the wall.

Be careful to completely wash (clean water) all acid and residue off the wall within the prescribed time after application. Be sensitive to acid / residue rundown contaminating areas previously washed. This is of particular concern when acid washing clay brick which has been laid above concrete masonry.

Be aware that any cleaning with water can introduce moisture into the flashing/weep system. Water introduced into weep-holes through cleaning can create efflorescence stains as it runs down the wall. Minimizing moisture entry into the weeps when cleaning will help prevent these white "drips"

Keep in mind that proper application of NMD-80 requires the use of a low pressure EC Jet attachment to a 3-5 gpm pressure washer. The EC Jet attachment ensures the proper mixing rate as well as ensuring that a high pressure spray of acid is not injected into the concrete masonry walls. Use of the pressure washer's chemical feed in **NOT** recommended!

Eaco Chem offer an array of information on their website: http://eacochem.com

Of special interest is EACO CHEM'S "Call from the Wall" option:

http://www.eacochem.com/callfromthewall/index.htm

We Recommend That Whatever Cleaning Procedure You Use, Follow the Acid Manufacturer's Directions, Test and Receive the Architects Approval BEFORE You Proceed. Inspect the wall after it has completely dried when any changes in color and texture can be accurately determined.

Abrasive Blasting:

If specifications allow use of abrasive blasting, always begin with a small test area and secure architectural approval before proceeding.

Abrasive blasting is typically used for spot cleaning - removing small areas of concentrated stains. Abrasive blasting takes off stains by removing a fine layer of the surface of the block. Similar to acid washing, caution must be taken as removal of the surface can significantly change the texture and color of the unit. Accordingly, both acid washing and abrasive blasting should be considered only if significant staining was allowed to occur.

Given the health risks associated with silica dust, caution must be taken when selecting the material for your abrasive blast equipment. Silica free blast media such as black beauty should be considered, used in conjunction with an overall Silica Protection Plan. OSHA outlines minimum steps that should be taken on their website at http//: www.osha.gov. If you do not have access to the web, contact our office and we will download a copy for you.

Once you have determined the equipment and blast media to use consider contacting your compensation insurer. Many will provide free testing to measure the amount of silica dust the cleaning process generates. Remember concrete masonry units themselves are a source of silica.

Typical materials and equipment that have successfully been used to abrasively clean concrete masonry are listed below:

Portable Air Compressor:	Approx. 14 Horsepower, 140-170 Psi
In Line Air Dryer	Similar To Hankanen
Hand Held Sandblast Unit:	Similar To NAPA Stg 17800 Using Steel Nozzles 13/64" I.D.
Blast Media	Black Beauty Fine Gradation

This is a typical set up used by auto body shops.

To minimize the change of texture/color of the unit you're cleaning- limit the time the blast is concentrated on the wall. Similar to a hand held spray paint gun, wave the nozzle back and forth on the unit in short bursts. Frequently

clean the area of dust to inspect stain removal and determine if the process is unacceptably changing the appearance of the masonry. One of the many advantages abrasive blasting has over acid washing is that it is a dry process. You do not have to wait for the wall to dry to determine your success- frequently check the results of your work.

Avoid contacting the mortar joint with the blast. When mortar is tooled the cement paste is drawn to the surface and seals the joint. Blasting off the cement paste (or acid etching) will reduce the water resistance of the mortar and wall. This is particularly true of the block-mortar joint interface. Removal of the cement paste by abrasive blasting or acid washing can leave a direct path for water to enter the wall system. A sign this has happened is when gaps, looking like fine cracks, are present at the edges of masonry units.

We Recommend That Whatever Cleaning Procedure You Use, Test And Receive The Architects Approval BEFORE You Proceed.

Diamond Polishing:

If specifications allow use of cleaning with a diamond disk pneumatic polishing tool, always begin with a small test area and secure architectural approval before proceeding.

Polishing tools are typically used for spot cleaning small areas of concentrated stains on Ground Face block. Diamond disk pneumatic polishing tools take off stains by removing a fine layer of the surface of the block. Similar to acid washing and abrasive blasting, caution must be taken as removal of the surface can significantly change the texture and color of the unit. Accordingly, acid washing, abrasive blasting and diamond disk pneumatic polishing tools should be considered only if significant staining was allowed to occur.

Typical materials and equipment that have successfully been used to spot clean ground face concrete masonry are listed below:

Alpha AIR-658 Pneumatic Polishing Tool with #120 diamond disks.

Wet grinding is more effective than dry, so consideration must be given to cleaning early, before wall and floor finishes are installed that could be damaged by moisture. When spot cleaning, be careful not to overwork an area. This can dig into the unit creating an indentation. Also, care should be taken not to expose more contrasting aggregate than the surrounding surface- it will appear that the color has changed.

Because you have to wait for the wall to dry to determine your success- it is best to practice your technique on block that have not been laid in the wall.

We Recommend That Whatever Cleaning Procedure You Use, Test And Receive The Architects Approval BEFORE You Proceed. Inspect The Wall After It Has Completely Dried When Any Changes In Color And Texture Can Be Accurately Determined.

Architectural Concrete Masonry Cleaning Recommendations- By Type CMU

Listed below are the different types of Architectural CMU and the cleaning procedures that we have seen work successfully.

We recommend that any cleaning procedure(s) you wish to use be tested first and approved by the owners architect prior to using them on the structure. "Building Code Requirements for Masonry Structures" requires sample panels be built on site for masonry governed by Level B or C Quality Assurance programs. The cleaning procedures you wish to use should be demonstrated on the sample panel. Work should not proceed until the owner's architect provides written approval.

Always start the cleaning process using the mildest or least aggressive form of cleaning. Only increase to more aggressive cleaning methods if the milder cleaning methods are not successful. Please keep in mind that not all stains can be removed from masonry without damaging the surface and creating an even more objectionable appearance. Improper cleaning can damage the water resistance of the masonry wall.

Smooth Face Architectural Concrete Masonry Units

Safest Cleaning Technique:	Water and a Stiff Brush
More Aggressive Cleaning Technique	Pressure Washer with EC Jet & Acid Detergent: EaCo Chem NMD-80 (Smooth Face CMU are very sensitive to acid cleaning- minimizing set time of NMD-80 to the shortest time possible will reduce the risk of cement paste removal- familiarizing yourself with the optimal set time on the sample panel will ensure quality cleaning- consider only one application of NMD-80, based on demonstration results)

Spec-Brik Architectural Concrete Masonry Units

Safest Cleaning Technique:	Water and a Stiff Brush
More Aggressive Cleaning Technique	Pressure Washer with EC Jet & Acid Detergent: EaCo Chem NMD-80 (Spec Brik CMU are very sensitive to acid cleaning- minimizing set time of NMD-80 to the shortest time possible will reduce the risk of cement paste removal- familiarizing yourself with the optimal set time on the sample panel will ensure quality cleaning- consider only one application of NMD-80, based on demonstration results)

Split Face/Split Rib Architectural Concrete Masonry Units

Safest Cleaning Technique:	Water and a Stiff Brush
More Aggressive Cleaning Technique	Pressure Washer with EC Jet & Acid Detergent: EaCo Chem NMD-80
Most Aggressive Cleaning Technique	Abrasive Blasting

Decro Face Architectural Concrete Masonry Units

Safest Cleaning Technique:	Water and a Stiff Brush
More Aggressive Cleaning Technique	Pressure Washer with EC Jet & Acid Detergent: EaCo Chem NMD-80
Most Aggressive Cleaning Technique	Abrasive Blasting

Ground Face Architectural Concrete Masonry Units

Safest Cleaning Technique:	Water and a Stiff Brush
More Aggressive Cleaning Technique	Pressure Washer with EC Jet & Acid Detergent: EaCo Chem NMD-80 (Ground Face CMU are very sensitive to acid cleaning- minimizing set time of NMD-80 to the shortest time possible will reduce the risk of cement paste removal- familiarizing yourself with the optimal set time on the sample panel will ensure quality cleaning- consider only one application of NMD-80, based on demonstration results)
Most Aggressive Cleaning Technique	Diamond Polishing

Ultimately, the cleaning procedure you use will vary with the color and texture of the masonry you want to clean and the procedure your masonry professionals and the architect are comfortable with.

Please keep in mind that nothing is more practical and cost effective than taking precautions to minimize staining during construction and using a brush and water to clean! More aggressive and most aggressive cleaning techniques can permanently damage the masonry if improperly used. Beautiful projects have been ruined by improper cleaning.

More than any other aspect of masonry construction- successful cleaning requires a talented experienced masonry professional.

In addition to the cleaning recommendations we have already made, the following technical publications are excellent industry guides on cleaning:

The National Concrete Masonry Association's:
TEK 8-2A "Removal Of Stains From Concrete Masonry"
"Inspection And Testing Of Concrete Masonry Construction"

The Masonry Society's - "Masonry Designers Guide" provides clear detailed language on sample panels and cleaning requirements based on "Building Code Requirements for Masonry Structures"

NCMA TEK Notes can be downloaded off our website at www.barnesandcone.com. Orders can be placed for the other publications by calling: The National Concrete Masonry Association or ordering from their bookstore at www.ncma.org

If You Have Any Questions, Or If We Can Assist You In Any Way, Please Call Our Office @ 315 437-0305.