

Virginia Lime Works has been a recognized leader in the field of historic preservation around the world for over a decade. But did you know that the same customer oriented dedication to finding solutions extends into new construction and ecologically friendly building as well? Whether its carbon dioxide sequestering stuccos to mortars and paints that have an "old world feel, with a modern practicality", Virginia Lime Works is here to help you make history.

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and more...

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Selected Images Courtesy Derrick Woods-Morrow Selected Enviro-Ment Images Courtesy John Sheally

Little did we know when Jimmy and Mike built our first small lime kiln to make lime putty for Thomas Jefferson's Poplar Forest in 1998 that our lives would be drastically changed in the way that it has. Over the past decade we have had the opportunity to be involved in some of the largest restoration projects in the country, including the Metropolitan Museum of Art, the Virginia State Capitol, James Madison's Montpelier, as well as countless private residences. What a ride its been!

In those early days we found ourselves desperate to learn more about historic masonry and traditional lime products. And in those days, information was hard to come by. Every day, we remember those challenges and re-commit to a simple motto, "How can we help you"? Those five words may seem commonplace for most, but they are everything to us. We are here to help you, whether you have questions on historic construction, traditional materials, new ways to build green, or just place an order. We like to think that we are here to help you "make history".

Today, we are humbled to see our products being specified and used all over the country. As our distribution continues to grow and the availability of our products has become more convenient, more historic structures are being preserved for generations to come and more craftspeople are building new buildings that are greener and more sustainable.

We look forward to w history"

Jimmy, Jeff, Tara, Mike, & Ashley

We look forward to working with you. Together we can "make



In 1996 while performing restoration services at Thomas Jefferson's Poplar Forest, master mason Jimmy Price decided that it was time to raise the bar in historic preservation. Tired of scientists and salesmen dictating which mortars were "proper" for fixing historic buildings while watching these materials fail and cause failure, he felt that historic materials needed to be created and made by craftspeople, for craftspeople. After researching historic burning techniques, kiln designs, and trial after trial of test runs, the first batch of traditional wood-fired lime putty was made... and Virginia Lime Works, a small family business founded by Jimmy and his children, was born.

When we started making lime and products for historic preservation help was hard to find. Everywhere we turned, we were met with information that may have been only half understood (or not understood at all) or answered with sweeping generalities. This process was frustrating to say the least. We decided right then and there that we would never allow anyone's questions to go unanswered if at all possible. We are here to make sure your project is a success. We also rely on a team of professionals (architects, engineers, scientists, and more) in the US and around the world to offer assistance if we can't help you ourselves. Your successful project is OUR successful project.

Whether it is our handcrafted wood fired limes from our small pot kiln nestled in the woods of Virginia or our hydraulic lime you can pick up at your local masonry supplier, you can be rest assured that just like that first batch of lime putty over a decade ago each of our products are made by craftsmen, for craftsmen.

Take advantage of our open door policy in which we invite people to chat with us about their project or our distance technical support via phone and e-mail. Or our on-site training and consultancy services, where we will actually travel to your site to discuss and help you on your project. Attend our workshops that provide first hand opportunities to actually learn, not just how to use our products, but how to ensure that the work done will stand the test of time. Or if you can't make it to a class, visit our YouTube channel or connect with us through our outlets in various social networks where we have a wealth of resources available.

If you are looking for lime for preservation, plasters and paints for green construction, or the best feeling mortars for new construction, we invite you to be part of our family. And make history with us.

Historic Preservation has always been a huge part of what we do at Virginia Lime Works. It was the preservation of Thomas Jefferson's Poplar Forest that pushed us to start making lime in the first place. For years, inappropriate materials had been used to fix historic buildings, and catastrophic failure and irreversible loss of historic fabric had occurred. We have to start looking at the materials that builders relied upon and have a proven track record for thousands of years.

But historic preservation is about more than just mortar. It's about examining the wall system, learning how these buildings have stood the test of time, and with that knowledge developing a solution that will extend its life by another century or so.

Historic preservation is about more than lime putty. Or hydraulic lime. Or a color match. Or colorwash and penciling. Every project is different, and making an informed decision that is based on the needs and wishes of the current occupants or the building's current use, along with being sympathetic to the historic fabric can be a daunting task, but we are here to help.

We have worked as an extension of design teams on massive projects like the Metropolitan Museum of Art and James Madison's Montpelier.We've had the distinct pleasure to be of assistance to many State Capitol restorations. We are happy to work with the homeowner who is looking to restore their rowhouse, bungalow, chimney, foundation, or even chinking a log cabin. We have made it our mission to make a difference by helping others.





LIMES C BINDERS

From our wood fired lime putties for fresco to our easy to use hydraulic limes which have restored countless historic structures, our limes and binders can be used to make a whole host of traditional mixes. A good mortar or plaster is only as good as what holds it together, and we trust that we've got the right material for you.











Consistency, Workability, Vapor Permeability, Flexibility, and Brightness are all qualities that one looks for in a hydraulic lime, and Virginia Lime Works Building Lime meets these criteria beautifully. Whether you are laying brick or stone, repointing historic masonry, stuccoing, or plastering, see for yourself why masons across the country describe our

Building Lime as "the only mortar I ever

want to work with".

Utilizing technology thousands of years old, Virginia Lime Works Building Lime is a hydraulic lime in which we take the finest quality double slaked hydrated lime and blend it with our special pozzolan (similar to brick dust or volcanic ash) to yield a consistent and long lasting material that conforms to ASTM C1707. Virginia Lime Works Building Lime is available in stock at most Virginia Lime Works authorized distributors.



	Building Lime 150	Building Lime 200
Compressive Strength (@28 days)	500 PSI	750 PSI
Permeability	Moderate/High	Low/Moderate
Bags per Pallet	45	45
Coverage (when mixed with 2.5 parts sand)		
Yield- cubic feet	3.75	3.75
Repointing Brick- square feet	375	375
Repointing Stone- linear feet	1100	1100
Laying Brick- standard brick	150	150
Plastering/Stucco- square feet @ 1/4"	100	100
Density (kg/m3)	2624	2600
Porosity (%)	27.06	26.94

H Y D R A U L I C BUILDINGLIME



to become finer and richer. Lime putties that are run directly from quicklime are considered better when applications require superior plasticity and carbonation. Also, as it is in a wet state there is a greatly reduced risk of the material carbonating while being stored. It can be argued that if one adds water to hydrated lime it forms lime putty, but this is both true and misleading. Since the material has previously been slaked it is already "hydrated" lime. When water is added it forms a lime paste. And although the particles of lime may absorb moisture and fatten, the continual process of dissolution and precipitation does not occur. Basically this is just an extension of hydrated lime.

On the same subject of slaking, it should be noted that the Romans had legislation stating that lime used for buildings must be aged for a period of at least three years. It should also be noted that this was due to the fact that the lime that they were burning was dolomitic. The magnesium carbonate found in dolomitic limes converts to magnesium oxide at a lower temperature than calcium component; therefore, there was often the possibility that the magnesium oxide was over burnt and would need a longer period to allow for hydration. In modern production, dolomitic limes are slaked by an autoclave (under pressure) process, which ensures the proper hydration of magnesium oxide.

Although slaking lime separately from mixing to make lime putty mortar is a process that is much discussed in historic preservation, it is only one way of hydrating lime to make mortar. The "hot mix" method of making lime mortar is a process that appears to have been used predominately for historic building construction. Taking the quicklime (also known as lump lime) fresh from the kiln and adding the sand and lime directly seems to provide a mortar that tends to have more durability than that of "cold mixed" lime putty and sand. It is often advisable to repair structures built with hot lime mortars with hydraulic lime, as the properties of this material tend to perform like hot lime mixes (strength, durability). Also, the evidence of lime inclusions (small particles of lime distributed throughout the mortar) is indicative of a hot mixed mortar, whereas lime "smears" or "streaks" often can be attributed to improper mixing of lime putty mortars. By using hot lime mortars for construction, the construction process could begin much earlier allowing the masons to get to work immediately while reserving and slaking lime in advance for plasterwork. Due to the potential for "air slaking" which may cause pitting and popping, hot lime mortars were not used for plasterwork.

After the mortar has been mixed with the prescribed aggregates and water is used in building or repointing, the mortar must set and cure. This process is known as carbonation. As the mortar dries (over the course of a few days to a week) the mortar will set and develop its final color. However, carbonic acid, atmospheric moisture laden with carbon dioxide, is absorbed into the mortar slowly over extended periods of time. This gives the mortar its final set, resulting in a mortar that has in many ways reverted back to its raw state of calcium carbonate. In some instances the mortar may stay wet indefinitely, as was evidenced by the discovery of uncured mortar deep in the walls at the Castillo de San Marcos, in St. Augustine FL, built nearly 400 years ago! These limes are known as air limes or non- hydraulic limes. They depend wholly on the absorption of carbon dioxide in order to set and gain strength. The presence of reactive silicates or aluminates with lime will result in the production of water limes or hydraulic lime, which has become one of the most trusted binders for the preservation of historic masonry.



THE LIME CYCLE: UNDERSTANDING HOW LIME IS MADE AND USED.

Unarguably the most common binder for mortars in historic masonry has been lime. Chemically, lime has been made from calcium carbonate, which can come in many different sources, such as limestone, oyster shell, marble, and coral. Limestone can contain minimal (hi-cal) to large amounts of



magnesium carbonate and those with higher levels are known as "dolomitic" limes.

The limestone is placed in a kiln and burned at temperatures (over 1650° F) sufficient to drive off the carbon dioxide and moisture from the stone, producing a material known as quicklime or calcium oxide. The process is known as "calcining," or "lime burning." Many different fuels can be employed for this process. Wood and coal were common traditional fuels that were utilized historically, while many limes today are produced by using gas heat. Traditionally, the burning of limestone with wood (which produces slight pressure in the kiln that can be conducive to lime burning) provided sufficient temperatures to calcine the stone while rarely achieving the higher temperatures possible by burning with coal or gas.

Once the quicklime has been taken from the kiln, it must be hydrated or slaked, which

is the action of combining moisture with the quicklime. When quicklime and water are combined an exothermic reaction takes place as the quicklime begins to swell and crumble away, producing a calcium hydroxide. If slaking is done with a minimum amount of water (steam or air), the quicklime breaks down to a powder, or a hydrated lime. If slaking is done with an excess of water, the material can be worked down to form milk of lime. This mix, over time, will settle out and lime putty will be formed. Also, when lime is made into lime putty, the material continues to slake, and the particles break down, dissolve, and then recombine, causing the particle sizes





MIX&GO

Mix&GO is Virginia Lime Works line of pre-mixed lime products for the restoration of historic masonry. Whether you are looking to repoint your turn of the century brownstone, or an 18th Century farmhouse, or replaster a bedroom in your American Foursquare or Victorian townhome, Mix&GOs are an easy to use, affordable solution to your project.









When you are looking for the simplest way to restore your historic structure, look no further than Mix&GO. Available in both RePoint (for standard repointing) and Butterjoint (for fine joints thinner than 1/8") grades, Mix&GO contains everything you need in one bag. Hydraulic Lime, perfectly graded sands, all you have to do is add water, Mix&GO!

	Mix&GO RePOINT	Mix&GO Butterjoint
Compressive Strength (@28 days)	500 PSI	500 PSI
Permeability	Moderate/High	Moderate/High
Bags per Pallet	35	35
Approximate Coverage		
Yield (gallons)	5	5
Repointing Brick- square feet	75 (1/2"x 3/4")	225 (@1/8" x 3/4")
Repointing Stone- linear feet	220 (1/2"x 3/4")	660 (@1/8" x 3/4")
Laying Brick- standard brick	30 (1/2" x 4")	90 (1/8" X 4")



Mix&GO RePoint and Mix&GO Butterjoint are available in standard white, a range of 50 stock colors, as well as custom colored (contact Virginia Lime Works for color matching fees) for seamless repointing of historic masonry. For a decade, preservation professionals and do it yourself-er's have depended on Mix&GO to breathe life into their building for future generations.

MIXEGO MORTARS



REPOINTING HISTORIC MASONRY

For over six thousand years, mortars have been made primarily of lime, sand and water. These limes could be hydraulic or non-hydraulic, made from stone or shell and could come in many forms such as quicklime (burnt stone), hydrate, or putty. Lime mortars offer advantages over cement based mortars, particularly in the repointing of historic masonry. First and foremost, lime mortars were the mortars used in the construction of many buildings built before the 1920's, and most buildings before the 1880's. They are generally less hard and more vapor permeable, allowing moisture to evaporate from the masonry. This will help to accommodate moisture levels in the wall and reduce the amount of soluble salts in the stone or brick faces. Lime mortars should be viewed as a sacrificial material and one of the functions of mortar is to allow moisture to migrate out of masonry through the softest point. If buildings are repointed with a dense, impervious cement based mortar, often the masonry (i.e. brick or stone) becomes

the softest point. If moisture is retained within the building units, the fabric may be exposed to damaging freeze thaw cycles salt reactions, and sulfate attack, which could cause greatly accelerated deterioration and decay.

Preparation:

Before any work commences, it is recommended to take your time and look at your project. Issues such as positive drainage, faulty gutters, or failing roof systems must be addressed. If these issues are not addressed, repointing may do little if anything to help your project.

As a good rule of thumb; if the mason is comfortable then the wall is comfortable. On hot days where accelerated drying may be an issue make sure the wall is well protected by shade cloths, or tarps, keeping attention to the absorption rate of the substrate. Protect all work from harsh drying winds or direct sunlight which could cause "flash curing", and from driving rain and frost which could cause mortar failure. The ultimate goal is to create a condition in which the mortar will dry out slowly and cure naturally.

Any existing defective mortar or pointing should be removed to a depth of at least one and a half times the width of the joint, (remove all friable material) but not less than ³/₄" to receive the new mortar. Prepared joints should be as clean as possible, existing mortar should be cleaned from the edges in the joint to ensure proper bonding between masonry unit (i.e., brick or stone), and the back of the joint should be square to receive the mortar. Any existing cement mortar must be carefully removed. If necessary, horizontal cement joints may be dealt with by carefully scoring the center of the mortar joint with an angle grinder to relieve the stress on the joint. Angle grinders should only be used by highly skilled masons and

should not be used on head joints as there is a greater risk of damage to the masonry. The remaining mortar in head and bed joints should be removed to the required depth using hand or pneumatic stone carving chisels. Do not grind mortar from any surface of the host masonry. Raking out shall leave a clean, square face of sound mortar at the back of the joint, and clean masonry surfaces. Mortar joints should not be shallow or feather edged. Existing historic lime-based mortar should be removed by hand. Use only hand or pneumatic stone carving chisels that are no wider than one half the widths of the existing masonry joints.

Take great care to not widen the existing masonry joints by damaging masonry units or spawl and chip the surrounding masonry edges in the process of mortar removal.

Remove debris from joints by brushing joint faces, vacuuming, or blowing with pressurized air. Joints may be rinsed using very low pressure spray assembly with caution. Verify that water will not migrate to other areas and cause damage (Remember, historic masonry is porous.) Ensure that all surfaces below rinse areas are wet prior to cleaning out joints so as not to cause staining of the masonry fabric.



Dampening:

The proper control of the host masonry's absorption rate can be the most important thing you can do to ensure your project is a success. If the host masonry is not thoroughly dampened the brick or stone could pull the moisture too quickly from the mortar which could cause shrinkage cracking, lack of bonding, loss of strength, and improper set. Depending on the type of brick or stone wall being pointed and the amount of area cut out and rinsed down you may have to re-dampen the wall before pointing. Misting with spray bottles or garden sprayers prior to pointing in that area is also a good way to keep control of the wall area being repaired. Large areas can be pre-dampened and managed by "painting" the wall with water using a water hose and garden nozzle set on a mist setting.

Pointing:

with, but moist enough to achieve any joint details required. This allows maximum compaction in the joint, and contact with the originial mortar, which reduces shrinkage cracking and the tendency to smear on the masonry surface. Fill out all major voids or relaying of brick or stone leaving the finish joint back about 1 1/2 times the width of the joint, this is usually about 3/4 to1 1/2 of an inch back from face of the masonry (ensure that all friable material has been removed). Site mixed Building Lime mortars and Mix&GO Pre-Mixed mortars can be installed in lifts of ³/₄" at a time. Maintaining an even amount of pointing helps to keep the consistency of replacement mortar the same and curing of the wall should come about in an equal and even fashion. The tooling of the finish joints should be determined and specified. Keep in mind that is often beneficial to tool new work to match the original existing joints on the structures whereas the original joint profile could be lost forever. Some tooling may be different from one location on a building to



After removal of the defective mortar and damping of wall, the wall is ready to start pointing. The mortar should be as dry as is practicable to point another, being either face work or backup work. The joint details from front facades to side or rear elevations may change, so be aware of existing evidence for making the proper determination of which technique should be used.

One method that can be used in pointing is to slightly reveal or trim back the mortar from the face edge of the brick or stone (by $1/16^{\circ}$ - $1/8^{\circ}$) detailing that unit. Keep the joint contained on the inside and do not let it come out to the outside of the brick. In keeping the joint contained it makes a much more attractive wall and when viewed the wall should blend together where existing joints have weathered and already are somewhat revealed.

Once the work is completed the mortar must absorb carbon dioxide to set. Make sure that the mortar does not flash cure within the first 12-24 hours but after that, it should cure out naturally. Make sure that the work is protected from harsh sunlight, drying winds, driving rains for at least a week to ensure this natural curing. When dealing in frost conditions, work should be protected from precipitation and freezing for no less than 2 weeks, possibly longer if moisture is retained in the wall, it will freeze. This time frame is always subject to change due to site conditions and work being performed.

When cleaning repointed work, the best option is low pressurized water (around 100 psi) and scrubbing with stiff natural bristle or nylon brushes. If detergents are used, please contact Virginia Lime Works or your preferred masonry detergent manufacturer (explain that you are working with a cement free, lime mortar) for more information.











<image>

Approaching the restoration of traditional three coat plasterwork can be a daunting task. Virginia Lime Works Mix&Go Plasters take the guess work out of mix designs, just add water, Mix&GO! And Mix&GO RenderCoat is ideal for other applications, like wood chinking and strawbale!

	Mix960 PacaCoat	Miv
	riixadu Dasecual	FIIXO
Compressive Strength (@28 days)	500 PSI	500
Permeability	Moderate/High	Mod
Bags per Pallet	35	35
Approximate Coverage		
Yield (gallons)	5	5
Plastering (1/4") sq ft	20	20
Plastering (3/8") sq ft	16	16
Plastering (1/8") for MG Finish Coat sq ft	80	80

Virginia Lime Works Mix&GO Plasters come in four distinctive blends. Mix&GO BaseCoat is a rich, coarse mix that is ideal for plastering first coats on wood or metal lath. Mix&GO RenderCoat is specifically designed as a first coat for masonry substrates and can be used as a second coat (or brown coat) for all backgrounds. Mix&GO FinishCoat is a fine white finish plaster for the smooth finishing of walls and is also available in a special blend for exterior applications.

MIXEGO COPLASTERS

&GO RenderCoat) PSI derate/High Three helpful hints to prevent cracking: 1) Don't try to put to much material on the wall at one time 2) Thoroughly control suction 3) Rub up cracks immediately as the appear using a wood float

THREE COAT PLASTERWORK: HOW AND WHY.

Plastering is basically applying layers of mortar to masonry, wood, or metal lath to form a finished wall surface. Plaster is applied (generally) in three coats for interiors and two coats for exteriors. These coats are known as:

- 1. The Scratch, Base, or First Coat
- 2. The Brown, Render, or Second Coat
- 3. The Set or Finish Coat (generally for interiors only)

Plastering on Masonry

When plastering on masonry and in particular to historic brick masonry, where there is a potential of an extremely absorbent substrate the thorough dampening of the masonry is essential. This may entail dampening to begin days before work is to commence. If the rate of absorption is not controlled there is a risk of the plaster drying to quickly which could result in a friable and deleterious material. To gauge if your wall is ready for plaster, using a Hudson Sprayer or a waterhose with a misting nozzle, spray the wall. If the water is absorbed immediately, misting should be continued. If it takes a moment for the wall to go from "glistening wet" to "damp", then the wall is ready to be worked on. After the absorption is

controlled, it may be necessary to "dub out" if there are deep irregular areas that need to be brought out to be closer to the level of the first coat. This should be applied and cured for a few days before the first coat of plaster is applied.

Using Wood Lath

When choosing the wood for lath, white pine is best, but spruce can be used as well. Yellow pine should not be used due to the amount of pitch it contains. Green "fresh" lath should not be used, although slightly green laths can be used due to the moderate amount of moisture in which it contains. If using dry wood lath, wet before use. Lath that is too dry can swell once the plaster is applied and may cause cracking

Common Laths are $1 \frac{1}{2}$ by $\frac{1}{4}$ by 4 feet. This will allow proper spacing when working with common 16° centers (or studs).

When attaching wood lath to the centers a nail should be placed at each stud and 2 nails should attach the laths at the ends. The laths should be

spaced approximately ¹/₄" to ³/₈" (a good rule of thumb is the thickness of the lath) from each other and the joints should be "broken" every 6 laths or about every foot or so, so that the entire wall doesn't not have seams from ceiling to floor.

Estimating Lath

Using the aforementioned dimensions of the wood lath, it will take approximately 1,500 laths (or 750 lbs of dry lath/1000 lbs of wet/green lath) for 900 square feet of wall surface.

Scratch Coat

Whether plastering to wood lath or masonry it is extremely important to thoroughly dampen your substrate. If plaster is applied to a dry masonry wall, the moisture will be drawn out of the plaster, causing flash drying and leading to the possibility of shrinkage cracks and de-lamination. If plaster is applied directly to dry wood laths, the moisture in the plaster may cause the laths to swell, which could cause cracking within the plaster. To minimize the potential for either of these problems, thoroughly dampen using a fine mist spray. However, do not over saturate the substrate. If there is standing water on the background on which you apply, allow time for it to balance out.

If applying plaster to Wood or Metal Lath it is recommended to use a well-haired (1/4- 1/3 lb to 5 gallons of plaster) plaster with a mix design of 1 part lime to 2 part sand. This richer mix will allow the plaster to "squeeze" through the laths more easily forming a better key (the mortar that grabs to the lath). The hair will also help hold the plaster together, in case the walls "keys" are ever broken, and help manage shrinkage. If plastering directly to masonry a well haired plaster mix design of 1 part lime to 2.5 parts sand can be used, although hairing this mix is not essential.



The following processes apply to working both on flat walls and ceiling work. Using your hawk and trowel apply the plaster to the lath or masonry (alternately a plaster spraying can be used as well on masonry). This initial coat should be approximately 3/8" thick. Take care not to attempt to put too much material on the wall at one time which may cause cracking. Apply the plaster in 2 lifts to make your coat, doubling back as the material takes up. Take measures to ensure that the plaster is of sufficient thickness but the truing up, or bringing the plaster to a true surface should take place in the second coat. The purpose of the Scratch coat is to merely put material on the wall in preparation for the truing coat. Before the plaster cures "scratch" the plaster in a cross-hatch diagonal design. This will allow maximum keying between the first coat and second. Slow cure the plaster for approximately 7 days (depending on conditions) before applying the next coat. As the mortar begins to cure take care to notice if any cracks develop. Most of these cracks can be fixed by splashing a small amount of water to the wall and then rubbing them in with a wood float for the first day or two after application.

Brown Coat

The mix design of your brown coat can be approximately 2.5 parts sand to 1 part lime. This material can also, but does not have to be, haired as well. Before application of the plaster begins it is very important to control suction again, whereas, if the plaster dries out too quickly flash curing can occur and proper bonding between the two coats will not take place. Using a fine mist spray dampen the substrate to maintain uniform suction. Now apply



lath to represent the level of the finish wall surface. Bring plaster to the sides of the lath to ensure that the lath will stay in its location. Using a level, establish that the "dots" are level and plumb. These "dots" will be your guides as you continue your plasterwork. When applying the plaster it may be necessary to apply 2 thin coats (one immediately after another) to achieve the required 3/8" thickness. This will allow you to apply sufficient pressure when applying to form a good bond and minimize cracking. Once the plaster has been laid on to the approximate thickness (using your dots as a guide) run a straight edge from the dots to ensure that there are no low or high spots. Fill in low spots and bring down high spots as necessary until the wall is true. For external renders and rougher sand finish plasters, this completes the process. If the plaster is receiving a finish coat, roughen the surface with a wood float or a devil's float (a float with a nail protruding approximately 1/16" through). This light scouring will provide the key for

applying the finish coat of plaster. The render can be finished in many different manners, depending on your tools, including having the render ruled to make it appear to be stone blocks, etc. Slow cure the work for at least 7 days ensuring that is kept in cool humid conditions and free from direct sunlight, freezing temperatures, rain, or harsh winds.

Finish Plaster

Before application of the finish plaster begins it is very

important to control suction. Thoroughly dampen your work before commencing with your finish plaster. Finish Plaster can be made in a variety of mix designs, but one of the more common mixes is 1 part of lime to 1 part of fine white silica sand which will make a smooth fine surface. When applying, plaster extremely thin coats of plaster. It will appear that you are "putting on and taking off" the plaster. Continue to do this, for approximately three lifts to achieve a smooth flat finish. These thin coats will allow you to apply an extremely "tight" plaster, with good bonding, and a nice true finish. After the plaster begins to take up, you can apply a little water and with a trowel polish the plaster to a soft, glass like finish. On the same note, if a wood or sponge float is used to finish the plaster, a light sanded finish can be achieved.

your dots to establish the thickness of your plaster. Apply a patch of wet plaster approximately 8 feet away from each other (or however long your straight edge or screed is) and then stick a well dampened piece of wood













LimePaint is a traditional casein bound lime wash or white wash that is based on recipes over a hundred years old. Unlike many lime washes Virginia Lime Works LimePaint is stable, with little to no dusting and applies in only 2-3 coats. It also contains no latexes, acrylics, or other non-traditional materials, is VOC free, and is ideal for people with chemical sensitivities.

	LimePaint (pail)	Limel
Weight	25 lbs	35 lbs
Units per Pallet	24 buckets	35 ba
Approximate Coverage		
Yield	5 gallons	appro
sq ft per gallon per coat	200	200
sq ft per unit per coat	1000	1400
sq ft per unit per 2 coats	500	700



Virginia Lime Works LimePaint can be custom tinted in a wide variety of traditional colors and is available in our standard "Bright White" as well as our range of 30 historic shades.

Paint (bag)

ox. 7 gallons

PAINTING HISTORIC MASONRY

Imagine your pipes are clogged beyond use. You have to call a plumber in to completely clear out all of the pipes in your home. Your plumber does a great job and your plumbing system is working like new. Then you tell your plumber to go ahead and gently coat all of your pipes with a little bit of grime and residue. Makes no sense, right? Well, going to the trouble of restoring your historic masonry and putting a modern paint over top of it makes about as much sense.

Walk around a historic downtown and often you see the same thing: storefronts and historic buildings with peeling paint. Or perhaps you are a homeowner who is in a cyclical paint mode, where you are repainting your house every year. Stop, take a breath, step back, and think to yourself: Why is this happening? Surely when the building was built, it wasn't repainted every year.

As you become more familiar with Virginia Lime Works, and our approach to historic preservation, you may now be starting to get an idea about what you should and shouldn't do when it comes to historic masonry preservation. If you are going to make the commitment to restore your structure properly, don't jeopardize your work by using an incompatible paint.

We know by now how historic masonry works. You are dealing with multiple wythes (or layers) of brick or stone laid with a traditional lime or clay mortar, which allows the masonry to breathe. If this breathability is compromised, which is often the case when the masonry is repointed with an hard impervious Portland cement mortar, or stuccoed with a Portland cement stucco, failure occurs. Water will find its way into the masonry, whether it is through the individual masonry units (brick or stone) or through methods underground such as open foundations. This water, if trapped through hard repointing, stuccos, or incompatible paint, can't escape. This leads the water to sit and pool within the historic masonry. This moisture starts to release the free lime (which gives the autogeneous healing property of lime mortars) and the lime, now in solution, begins to move around. The lime will be drawn through hydroscopic pressure to the face of the masonry, where it is deposited and starts to carbonate. This is often described as lime leach and can be a serious problem. Now there is no binder, or glue holding the mortar together, and what is left is merely sand. Frequently, if you remove a modern paint or Portland cement stucco or repointing from historic masonry, you see this issue and think, "My goodness, this historic lime mortar hasn't held up at all!" Again, for the most part, this isn't the fault of the historic materials, but the interjection of modern substitutions during previous repairs. These modern substitutions often have a decay cycle of 5 to 15 years, although some issues may not come to light until 20-30 years later. Using traditional materials, you should expect a repair cycle of every 50-100 years. But to expect this, you can't use half measures, you need to look at everything. When you think of the modern materials that can cause irrevocable damage to historic masonry, the first thing that comes to mind is Portland cement mortars and stuccos. However, modern paints and coatings can be just as damaging. A good rule of thumb (although there are exceptions to the rule), is if doesn't feel natural, then it may not be compatible with historic masonry. Latexes, acrylics, elastomerics, and other coatings that are common to our buildings of today, may not mix well with an older structure. Limewashes, milk or casein bound paints, colorwashes, mineral paints and whitewashes, that are made of traditional materials for the most part, will be a much better fit when painting your historic building. Let's look at each of these types of paints to get a better understanding of their uses and limitations.

Limewashes

Often just a mixture of lime and water, this diluted lime putty applies in numerous (sometimes 8-12) coats and will need to be repainted every year or so in the beginning. However, over time these ultra-thin layers of lime will build up, making a durable, breathable, and compatible coating. In fact, after a few years of limewashing, you might be able to go 5, 10 or 20 years without reapplying. Depending on your substrate and application, you may have moderate to heavy dusting. Due to the concentration of lime, the color palette commonly available will be light creamy or pastel tones.

Milk or Casein Bound Paints:

These are basically limewashes with a little something special. Casein is a protein commonly found in dairy products that is used in a wide variety of

Colorwash:

Colorwash is a matter of debate in the historic preservation industry at this time. At Virginia Lime Works, we feel that colorwash was an extremely common masonry coating found on most historic brick buildings from the 1600s to the 1900s. A combination of potash alum, natural pigment, and water, this masonry stain could be tinted to very strong colors, such as brick red, and could help clean up, rough, mortar stained, irregular brickwork, providing a clean uniform appearance. If applied properly, colorwash should have a life cycle of approximately 15-20 years, and will wear away gradually over time, versus flaking or peeling. Often colorwash was used in conjunction with "penciling", a mixture of chalk, glue size, and water, painted on the mortar

joints lending the brickwork a very crisp uniform appearance. Today colorwash can be found as a red discoloration to the mortar joint. Colorwash works best if made fresh, on-site, and used within a few hours while warm.

traditional materials such as salt.

Hopefully, you now have a sense of what are good coating options for historic masonry and the reasons why. Alternatively, if you are using a durable lime mortar (such as one made with a Hydraulic Lime), you may not need to paint at all. But if you do choose to paint, make sure your decision is an 31 informed one.

applications, but in the context here, gives the paint a little extra binder. When you are making paint, or a coating, you need two primary ingredients, a binder (or glue) and a solvent (or thinner). In the case of Milk Paints, your solvent is water, and your binder is not only lime, but also this "milk glue." Often you are looking at the same repainting cycle as limewash, but with only two to three coats per application. With the addition of this extra glue in the form of casein, stronger, although primarily muted tones, can be achieved with casein paints.

Mineral Paint:

Definitely in a class of its own, Mineral Paints, (also known as Waterglass or Silicate Paints) are remarkable coatings. Developed in Europe in the late 19th century, the silicate absorbs into the substrate and achieves a chemical bond between the coating and the masonry. A traditional silicate coating should be extremely long lasting (some examples of the lasting power of Mineral Paints are still incredibly vibrant, although over 100 years old). Mineral Paints are breathable and work well with traditional historic masonry.

Whitewash:

Whitewash is a generic term that can be applied to your most basic of limewashes to mixtures of animal glues with chalk. With mix designs using additives such as blood, salt, and even urine, various recipes will produce a wide variety of results. Many of the best whitewash recipes are mixtures of lime with

MISCELLANEA

From our original wood fired lime putty and oystershell putty limewashes to goat hair for plaster, we've got a wide variety of assorted products to help ensure your project is a success.

WOOD FIRED

Our original! Handcrafted lime putty made in Virginia Lime Works traditional wood fired pot kiln.

Virginia Lime Works Wood Fired Lime Putty is designed specifically for fine butterjoint mortars (when colorwashed and or pencilled), interior plasters, and plasters for fresco and decorative arts. Virginia Lime Works Wood Fired Lime Putty is not recommended for repointing of historic brick or stone, or for exterior stucco finishes. For repointing and exterior applications, we recommend Building Lime 150.

Available in 5 gallon pails-limited availability

The finest animal hair for use in traditional lime plastering.

Choose from goat (our personal favorite) or horse hair. Hog Bristle and other traditioanl animal hairs available upon request. Recommended dosage is 1/4 lb per bag of Mix&GO or 1 pound per bag of lime when site mixing.

Available by the pound

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Cement free restoration/replication mortar for the repair of spalled or chipped stone

Masons Mark is a cement free lime based repair compound for the insitu restoration of stone and terracotta. Available in five gallon pails and custom colored, Masons Mark is the perfect (and affordable) material for repairing cornices, belt courses, and other stone features on historic masonry.

Available in 5 gallon pails

Our Original Limewash product made from our handcrafted wood fired lime putty.

Virginia Lime Works Traditional Limewash is a blend of our traditional wood fired lime putty and water. Applied in 6-10 coats, Virginia Lime Works Traditional Limewash can be used on historic brickwork, stonework, and renders. More a compatible but more durable option please see Virginia Lime Works LimePaint.

Available in 5 gallon pails-Limited Availability

For thousands of years, builders depended on lime to create some of our greatest architectural treasures. But nearly a century ago this technology was surpassed by the use of Portland Cement. We wouldn't have some of the structures we have today without cement technology. But, is cement always better? Using lime instead of cement offers a host of benefits for many new and conventional construction applications.

It is the perfect non-staining mortar for laying stone, particularly sandstone, brownstone, and Indiana limestone. Its natural properties of wicking water away from the masonry units allow moisture to dissipate through the mortar joint, which will help ensure the integrity of the stone for generations.

number of weep holes, and more.

bonding between masonry units.

The natural color of lime (white) produces far more attractive colors than grey cement, they are softer and brighter. White mortars are simple to achieve with light colored aggregates. The workability of lime is second to none. When cement is removed from lime mortar, it produces a rich, full bodied, and creamy mortar that will seem to spread for a mile on the wall.

We've always said lime was green before green was green. Lime mortars and plasters can be recycled into dozens of new applications. Lime absorbs a good percentage of its weight in carbon dioxide. It's hygienic and it dissipates moisture, helping to prevent mold, mildew, and unhealthy building syndrome. It contains no harmful chemicals or unhealthy V.O.Cs. It's simple and its uses in green construction are endless.

Strawbale construction? Perfect plaster for interior walls. Perfect stucco for exterior walls. Cordwood Construction? Ideal for bedding the wood and dissipating moisture, preventing rot. Green Concrete? Check. Adaptive Reuse? Affirmative. Green alternative to conventional mortar or stucco? Yes, please. And then of course, there is our spin on green and sustainable masonry construction: Enviro-Ment Building Systems.

On that same topic, it is the perfect mortar for mitigating moisture in brick masonry structures. Each mortar joint will act as a weep, eliminating the need for drainage mats, reducing the

Lime, particularly our Building Limes, have wonderful adhesion, promoting improved

PLASTERSTONE

More beautiful than conventional stucco, more economical than cut stone, PlasterStone is a high-performance, easy to use stucco system that is specifically designed for application over brick, stone, or lath. PlasterStone is a traditional lime stucco that combines a high quality, superior finish, with the many benefits of working with lime. From its autogeneous healing properties that help eliminate cracking, the amazing bond that you get when applying over block or brick, or the natural curing process that sequesters and converts carbon dioxide into a harmless mineral, PlasterStone is a beautiful, green, and economical finish.

Plasterstone is a trowel applied finish coat to be applied over a coarser render made with our BL-150, BL-200, or over our Mix&GO RenderCoat (total thickness of system, no less than 7/8") for a durable, long lasting, crack resisting, and beautiful cut stone finish.

•Superior mitigation of water (PlasterStone is microporous and absorbs and evaporates water like natural stone)

•Improved indoor air quality (no barriers for mold and/or mildew to grow)

•VOC free (wonderful for interior finishes like range hoods, wine cellars, and decorative details)

•Easy to install (apply and carve back to expose finish)

ENVIROMENT BUILDING**SYSTEMS**

Enviro-Ment Building Systems is an intergrated masonry wall comprised of lime based Enviro-Ment Masonry Units that are bedded in hydraulic lime mortar, filled with a lime based insulated grout and then finished with traditional stucco, brick or stone veneer, lime paint or even clad with wood siding!

Imagine a method of building that is backed by thousands of years of performance.

Enviro-Ment Building Systems takes the fundamentals of historic building construction, the same fundamentals that can be found in cathedrals, temples, and amphitheatres, and couples them with modern technology. Enviro-Ment Buildings allow moisture to move, versus being trapped, eliminating mold and mildew, and providing resistance to flooding. They resist fire and contain no VOCs. Quick, efficient, and simple, Enviro-Ment Building Systems is simply BETTER BUILDING NATURALLY!

ENVIRO-MENT MASONRY UNIT

Cement Free, breathable, carbon dioxide sequestering, building block for a conventional approach to environmentally concscious construction.

Our Enviro-Ment Masonry Units are the combination of thousands of years of building technology coupled with the conventional methods of "block" construction. When used with Building Lime mortars and En-sulate Grout, insulation values approaching R-30 are possible.

STUCCO/PLASTER

Traditional Stuccos, Renders, and Plasters to provide the best air quality in a building.

Instead of something that "looks like" old world stucco, why not just use the real thing! Easy to apply on any masonry substrate Mix&GO RenderCoat (or Building Lime 150 mixed with 2.5 parts sand), is an attractive, long lasting, substantial, and eco friendly finish.

Hydraulic lime mortars perfectly suited for bedding Enviro-Ment Masonry Units

Building Lime mortars provide the same level of flexibility to this new building system as it does for historic buildings. Traditionally, lime mortars are part of the reason that our great architecture is still enjoyed today. Its' flexibility cushioned building units and allowed for the gentle movement of structures gradually over time are partly responsible for the absence of control joints in many of our built heritage. Building Lime can also be used in other eco-friendly methods of construction as bedding material for cordwood or plasters and renders for straw-bale!

Our amazing insulating grout that will turn a cold masonry shell into a warm and comfortable home.

En-sulate Structural Grout is a formulated blend of our hydraulic lime binder with aggregates, and insulating filler. It is highly resistant to thermal transfer and acts as a bed for the interior wythe of the Enviro-Ment Building System. It can also be used as an alternative for pourable chimney lining systems of historic buildings.

Custom colored Mix&GO Premixed Hydraulic Lime mortars and plasters for the seamless restoration of your historic property.

We also offer a custom color service in which we match an existing sample to one of our Mix&GO Premium Mortar mixes. The versatility of Virginia Lime Works Mix&GO is unsurpassed. Using our Building Limes and a hand picked gradient of sands, they offer a high degree of workability and performance. PLUS, our pigments are weighed out to 0.1 gram per 1000 lb batch of mortar, so consistency in color is never an issue!

WORKSHOPS

Sometimes, you need a little more assistance than you can get from a phone conversation.

Virginia Lime Works staff is available to come out and take a look at your project. Our consultancy services include mortar sample retrieval, historic structures report assistance, project jumpstarting, hands-on application direction, and more. We also offer workshops at Virginia Lime Works for a memorable and enjoyable lime learning experience.

SERVICES

Whether you are looking for a consulation for your historic home or getting started on your new green structure, or looking for a mortar match or analysis, Virginia Lime Works is here to do what we can to make your project a success.

Basic acid digestion analysis to determine mix designs and information from original lime mortars

Virginia Lime Works offers a basic mortar analysis service, which includes:

- A description of the original mix composition including information on the
- proportions of lime, aggregates, and other additives.
- A sample of replicated mortar, ready for installation.
- Evaluation of aggregates for use within a lime mortar.

If you call us at Virginia Lime Works, you'll always be greeted with a friendly voice, and a person who knows not only our products, but has firsthand experience with working with them. You may talk to Jeff, who started going to work with Jimmy on projects when he was 7 years old, or Mike, our plant manager who is an accomplished plasterer and has his hand in every product we create, or Jimmy himself, with 40 years of experience laying brick and building. Or check out our YouTube channel, our blog, or connect with us on most social networking sites for information about historic preservation or green building.

Colors are representative only. Please visit you Virginia Lime Works dealer to see actual mortar colors or contact us about our kits available for purchase.

Also available in custom colors

SMG-001	SMG- 026
SMG-002	SMG- 027
SMG- 003	SMG- 028
SMG- 004	SMG- 029
SMG- 005	SMG- 030
SMG-006	SMG- 031
SMG-007	SMG- 032
SMG-008	SMG- 033
SMG-009	SMG- 034
SMG-010	SMG- 035
SMG-011	SMG- 036
SMG-012	SMG- 037
SMG- 013	SMG- 038
SMG- 014	SMG- 039
SMG-015	SMG- 040
SMG-016	SMG- 041
SMG-017	SMG- 042
SMG-018	SMG- 043
SMG- 019	SMG- 044
SMG-020	SMG- 045
SMG-021	SMG- 046
SMG-022	SMG- 047
SMG- 023	SMG- 048
SMG- 024	SMG- 049
SMG- 025	SMG- 050

VLP-BRIGHT WHITE	No. 1000 Low Country	No
no. 1004 Ryann's Peach	NO. 1005 OLIVIA BLUSH	NO. 1006
No. 1009 Jackson Gray	No. 1010 Eyes of Reagan	NO.
NO. 1015 JEFFERSON GREEN	No. 1018 Kathleen's Apron	NO. 1020 (
NO. 1023 MONROE HOUSE	NO. 1024 DOLLY'S LINEN	NO. 102
NO. 1028 EARL GREY	No. 1029 Tatom Sand	NO. 10
No. 1033 ANTIQUE LESS	No. 1034 Sweet Potato Pu	
INO. 1055 ANTIQUE LACE	INO. 1034 SWEET POTATO PIE	NO. I

Colors are representative. Please contact Virginia Lime for samples.

Also available in custom colors

WWW.VIRGINIALIMEWORKS.COM

Join the family and connect with Virginia Lime Works!

Virginia Lime Works products are available from:

MAIN: 434.929.8113 FAX: 434.929.8114

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> Mailing POBox 516 Monroe, VA 24572

