

Stucco basics and the option of restoration as a cost-effective alternative to paint or resurfacing.

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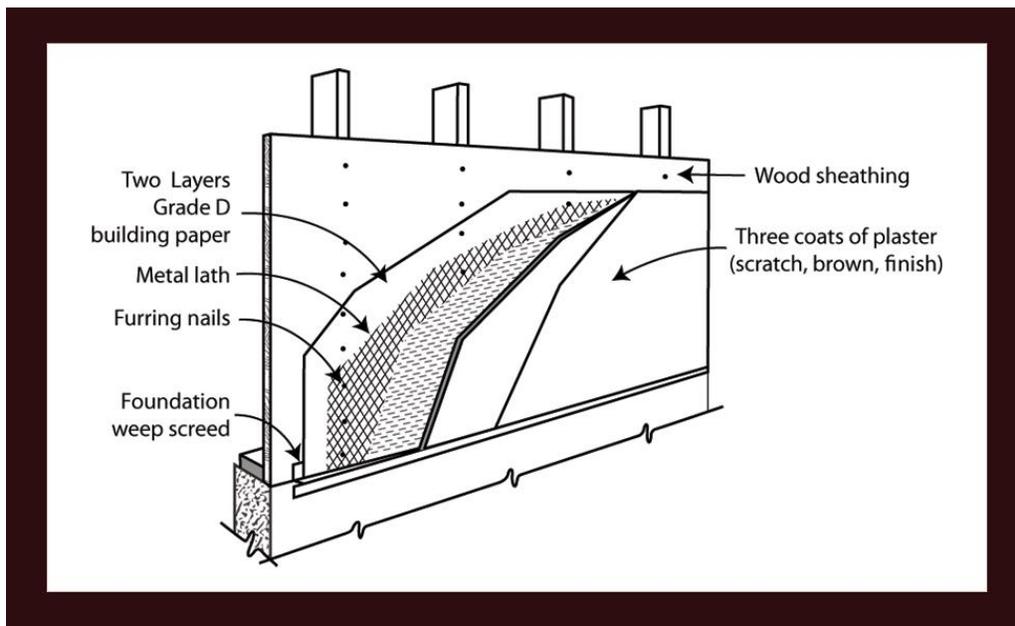
Section 1 – What is stucco and why is it so popular?

Traditional, three coat plaster wall systems (commonly known as stucco) are a popular choice for exterior wall cladding in dry climates.

Some major characteristics of stucco include.

- **Economic:** stucco is a popular choice given its moderate cost and long lifespan.
- **Water resistant:** when properly installed and cared for, stucco can protect against moisture.
- **Breathable:** stucco systems allow water vapor to circulate out.
- **Durable:** stucco is hard enough to resist physical damage and damage from the elements.
- **Fire Resistant:** stucco is non-combustible.
- **Pest Resistant:** stucco is not subject to wood consuming pests.
- **Energy Efficient:** stucco provides good insulation performance.

The components of a three-part, conventional stucco system include a moisture barrier (often two layers of Grade D building paper), a metal lath, weep screed and other specialty components, a plaster 3/8" thick "scratch" coat, a plaster 3/8" "brown" coat and a finish (Color coat) installed in accordance with applicable building codes and manufacturers written installation instructions.



Other types of stucco.

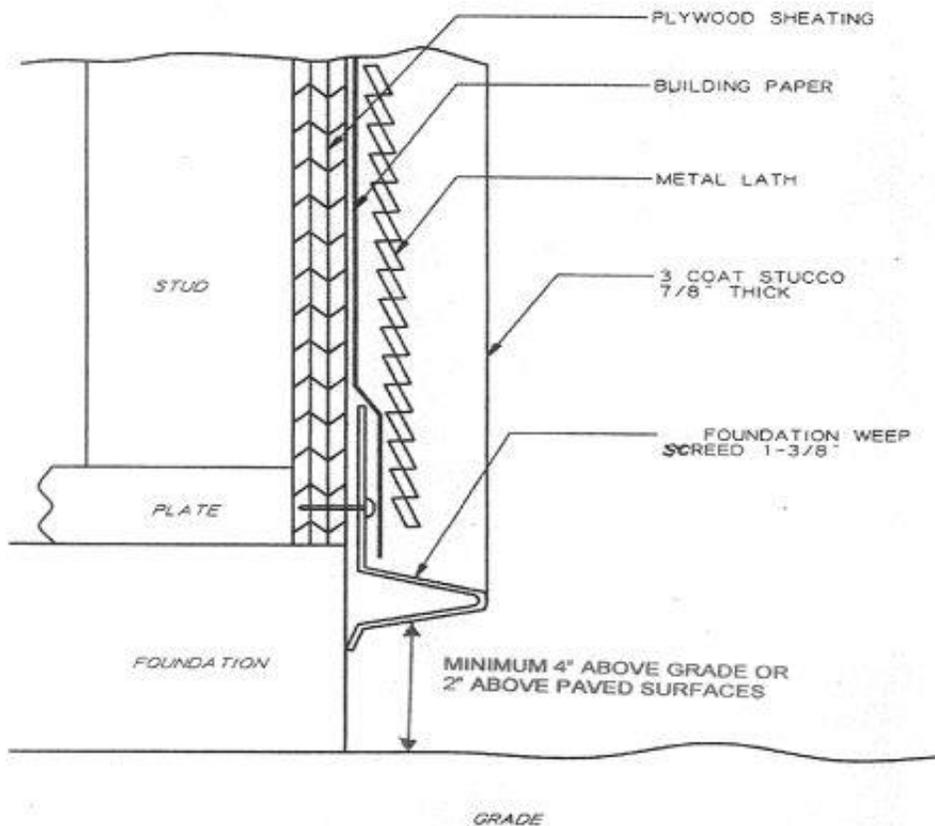
Other stucco systems include Acrylic Stucco, which is based on acrylic resins being substituted for one or more of the cement-based plaster layers. "One-Coat" systems which mix fibers and other non-cement compounds into one or more plaster coats. EIFS, commonly pronounced as "EEFIS", is another stucco system, typically composed of an insulated Styrofoam panel affixed to wall sheathing, then covered with reinforcing mesh, followed by a base and finish coat.

How stucco works.

A principal misunderstanding is that stucco is not intended to be a waterproof system. Stucco is designed as a water shedding system. Stucco walls only very slowly absorb water, at a rate measured at approximately 1/8" per hour. Any additional water simply runs off the surface. The very small amounts of water absorbed by the cement stucco exterior migrates down the wall, to drip to the ground at weep screeds, or moisture is simply returned to the air via evaporation. This protects the "waterproof" layer (the building paper) from contact with the elements.

Moisture migrates down the wall to a drip edge (weep screed) located at the base of stucco walls. This weep screed is an important part of the system as it keeps moisture from coming into contact with the framing and wall sheathing (OSB or plywood).

FOUNDATION WEEP SCREED INSTALLATION DETAIL



Note – Building codes have increased the distance required above grade to protect the integrity of the weep screed system.

The ability of stucco to allow water vapor to find its way out (a characteristic called vapor permeability) is comparable to how a "Gore-tex"TM jacket can protect from rain and avoid trapped moisture.

Experienced hikers will tell you that a breathable outer layer performs much better than a completely “waterproof” outer shell because the “waterproof” layer traps moisture, whether the moisture comes from sweat, or from rain that drips down the back of your neck (small leaks at eaves, windows, doors, cracks, or at other stucco openings).

Characteristics of unpainted stucco.

Unpainted (natural) stucco is tolerant of hairline cracks, gaps and the penetration of modest quantities of moisture that may find its way through and behind the stucco plaster. Unpainted stucco is tolerant of UV radiation, protected by an exterior that contains quartz sand, a reflective material.

Natural stucco does have weaknesses. Stucco is a hard, semi-porous material that is susceptible to cracks and staining from surface water carrying contaminants (dirt, soot, and other chemicals) and can lose color when continuously exposed to sun and the elements such as on horizontal surfaces.

Both painted and unpainted stucco will stain from organic compounds, such as from certain trees and plants, fertilizer released from planters, or animal waste, such as that from pets or birds.

Characteristics of painted stucco.

Painted stucco is not tolerant of cracks or from the entry of moisture from any gaps at eaves, windows, other penetrations. Paint typically has some flexibility and bridge cracks. Painted stucco is particularly vulnerable to moisture entering the system at ground level from sprinklers or inadequate clearance below weep screeds.

Paint is durable and can be cleaned if done carefully, and carries a uniform color. Paint is a layer that bonds to the exterior of stucco through adhesion, and therefore considerable preparation is required to secure a proper paint bond (see paint manufacturers recommendations). Paint is vulnerable to UV radiation, and requires repainting at regular intervals to prevent pinholes, or peeling.

Section 2 – Sources of damage to stucco and how stucco is protected.

The author has extensive experience in the hands-on repair and maintenance of all of the types of damage shown in this section. Opinions expressed are my own, drawn from 25+ years' experience.

Stucco cracks.

In general, there are three types of cracks we observe in cement stucco exteriors.



Shrinkage cracks - These cracks are initially created in the first few years after construction as the framing lumber shrinks and the building experiences deflection (settling) due to the weight of the building and building contents. These cracks once repaired often do not return.

Thermal cracks – Looks just like shrinkage cracks, but typically occur and reoccur on the stucco surfaces exposed to the heat of the sun as the stucco expands and contracts over the course of the day.

Shrinkage and thermal cracking typically occur at the corners of doors and windows.



Movement cracks – Typically located at the intersection of building elements, or arising from the ground, movement cracks are typically longer and wider, and are therefore the most likely to be a source of water penetration or intrusion.

Movement cracks typically require a deeper level of repair, involving opening up the crack, filling the crack with a polyurethane caulk and then re-stuccoing the surface to match the existing stucco plane, texture and color.

The severity of cracks is considered as follows.



Hairline cracks – the surface appears cracked but there is no visible gap.



Normal cracks – a gap is visible in the crack, less than the thickness of a dime, and the crack edges are solid and undamaged.



Weathering cracks - a gap is visible in the crack, less than the thickness of a dime, but the edges of the cracks are soft and beginning to peel and flake. This is evidence that the crack has been subject to water and weathering. Over time, weathering will cause the crack to grow.

Structural cracks - a gap is visible in the crack, equal to or larger than the thickness of a dime. Such a crack indicates a crack down through the scratch, brown and finish layers of the cement stucco exterior (and possibly deeper (requiring repair of the framing)).

Aside from cracking, other sources of damage include....



Physical impact – The result of impacts on corners and kicking of stucco at ground level, producing damage to the weep screeds.



Staining – Staining occurs when dirt, soot, organic chemicals run down the face of stucco to stain the open pores of stucco. Note staining above the scupper (off of the deck), and below the scupper due to the lack of a drip edge.

Recommended repair method for structural or deep weathering cracks.



Crack opened with grinder to within 1/16 of building membrane.



Continuous bead of polyurethane caulk bridges opened gap.



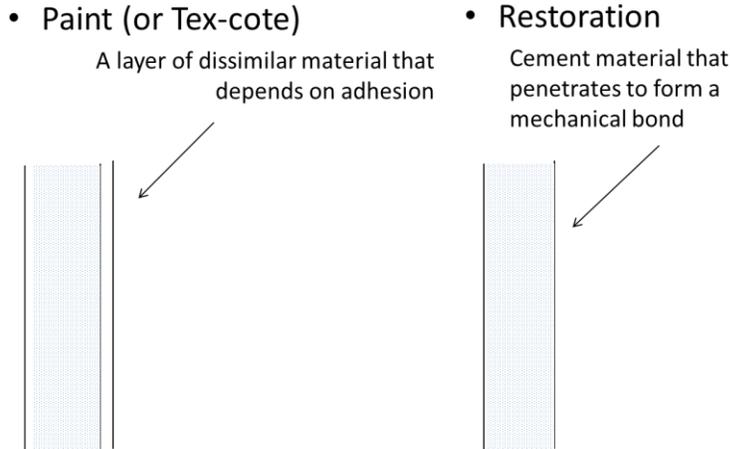
Rough coat stucco covers repair area.



Finish coat of stucco over repair area.

Section 3 – The next generation of stucco restoration materials.

For decades, the primary option for the maintenance of stucco, as recommended by the SMA (Stucco Manufacturers association) has been a [product called fog coat. Comprised of white cement, lime and pigments, fog coat was used to refresh stucco exteriors. Fog coat depends on creating a mechanical bond with the underlying stucco, becoming part of the stucco and therefore not subject to peeling.



Stucco Colormatch has extensive experience with fog coat, testing such products from a wide range of manufacturers. Our experience and the experience of our clients is that standard fog coat has enabled them to save over the cost of paint, but that the performance of fog coat has drawbacks in gradually darkening over time as well as being soft (not lasting well on horizontal surfaces).

The industry has responded with higher quality versions of fog coat, acrylic admixes to enhance bond and durability, and cement-based coatings such as Merlex Allegro II for high-wear areas such as horizontal surfaces.

This next generation of cement-based refinishing products is more durable, color-fast and can be applied as a “touch-up” in a color matched form that does not require application “corner to corner” such as with paint. This creates the possibility of low cost maintenance with color-matched, cement based materials (restoration).



Stained stucco.



Restored stucco.

Stucco Colormatch is a pioneer in this new generation of restoration materials, using them in a wide range of stucco conditions since 2013. These materials are proving to be durable and color fast.

Section 4 – The advantages and disadvantages of paint, resurfacing and restoration.

Paint

All paints generally have four main ingredients -- pigments, binders, solvents (liquids) and additives. Pigments provide color and hide, while binders work to "bind" the pigment together and create the paint film. Solvents are the liquids that suspend the ingredients and allow you to place the paint on the surfaces, and additives are ingredients that provide specific paint properties such as mildew resistance.

As mentioned, paint depends on adhesion and therefore the surface must be free from any loose material, dirt or dust. Paint forms a layer on the surface of the stucco.

Paint advantages

Uniform color, available in a wide range of color choices.
Change of color is easily done.
Has some elastic properties enabling it to bridge minor cracking.
Can be (gently) cleaned. Depending on the paint.

Paint disadvantages

Costly, due to 100% coverage needed plus caulking of all penetrations.
Intolerant of moisture that finds its way behind the paint (cracks, gaps, wicking from damp soils).
Cannot be "touched-up".
Requires regular repaint over 100% of surface area.
Hides the areas where water is getting into stucco walls.

When is paint the only effective choice?

When stucco systems have been installed improperly, or are failing due to damage from earthquakes or when lack of maintenance has allowed flashings to rust or decompose, paint when properly applied and re-applied per manufacturer's recommendations may be considered a cost-effective option when compared to the cost of removal and replacement of the stucco system.

Resurfacing

Resurfacing (application of a skim-coat) is the process of applying a bonding agent (glue) to the exterior of a stucco wall and applying a new finish coat of stucco.

Resurfacing advantages

Uniform color, available in a wide range of color choices.
Change of color and texture can be easily done.
Leaves the building looking new, with a uniform cement finish.
Color can be touched-up in the event of damage or stains.
Does not need reapplication.

Resurfacing disadvantages

Costly due to necessity of 100% coverage.
Invasive, requires heavy work, likely including scaffold.
Finish vulnerable to staining.
Finish does not last as long as the original stucco.
Vulnerable to peeling in the event of earthquake or building movement (see movement cracks).

Restoration

Restoration is the process of repairing and refinishing the existing stucco exterior.

Restoration advantages

Least cost if color is not changed since not all stucco need be refinished.
Can be touched up.
Does not compromise the stucco systems' ability to shed and release moisture.
Reveals areas where water is getting improperly entering stucco walls.

Restoration disadvantages

Vulnerable to staining, especially from wildfire soot stains.
Works most efficiently when keeping the same (or similar) color stucco.
Cannot do a significant color or texture change.

Section 5 – Industry standards for painting stucco.

Step 1: Pressure-wash walls to remove dirt and dust buildup.

Step 2: Repair cracks and voids, including deep repair of movement cracks.

Step 3: Remove loose paint (if painted).

Step 4: Open up cracks where stucco adjoins wood surfaces to caulk all gaps.

Step 5: Apply a coat of primer per manufacturers recommendations.

Step 6: Protect Doors, windows, vents, lights and other penetrations.

Step 7: Paint the exterior according to the number of coats and thickness of coats called for by paint manufacturer.

Section 6 – Industry standards for resurfacing stucco.

Step 1: Pressure-wash walls to remove dirt and dust buildup.

Step 2: Repair cracks and voids, including deep repair of movement cracks.

Step 3: Remove loose paint (if painted).

Step 4: Open up cracks where stucco adjoins wood surfaces to caulk all gaps (if painted).

Step 5: Apply a bonding agent over the entire surface.

Step 6: Protect Doors, windows, vents, lights and other penetrations.

Step 7: Apply a skim-coat of new stucco over 100% of the surface area.

Section 7 – Proposed industry standards for stucco restoration.

Step 1: Nylon brush away loose surface dirt, and stains.

Step 2: Remove loose stucco.

Step 3: Repair cracks and voids, including deep repair of movement cracks.

Step 4: Protect Doors, windows, vents, lights and other penetrations.

Step 5: Apply a color-matched restoration material appropriate to stucco conditions.

Section 8 – The case for stucco restoration, strengths and weaknesses.

The porous nature of stucco has many advantages. The system is tolerant of cracks, sheds and releases moisture easily and is durable. Restoration preserves these advantages by refinishing stains by bonding to and becoming part of the cement finish, i.e. it does not peel.



An elastomeric paint that has lost its ability to adhere to a chronically damp stucco wall.

The financial case can best be illustrated by the real-world experience of Harbour Island Homeowners Association. In a calculation made by Association Reserves, the cost per homeowner of painting the entire complex every 10 years was \$81 / month. The cost of restoring the stucco (refinishing) only those areas that were stained every 5 years was \$27 per homeowner / month.



Before – Substantial stains at walkways, geyser leaks and decks on back side of buildings.



After – An unpainted, 28-year-old complex that looks refreshed every five years.

Restoration has a few weaknesses in that stucco is vulnerable to staining when exposed to weather or surface contaminants, especially soot from wildfires. Care for stucco therefore includes maintenance of gutters, drip edges, control of irrigation systems, and removal of plant material that produces organic stains. Eliminating the sources of staining will extend the esthetic lifespan of stucco restoration.

Section 9 – Smooth stucco restoration.

In our years doing stucco restoration, nothing has been more surprising to ourselves or to industry veterans than what is possible in performing color-matched, customer service on smooth stucco.



The situation – Window was installed in the wrong location for custom cabinets that were designed off of the plans. Stucco was removed, window moved, stucco patched. Aside from the repair scar, and color, the repair was done leaving ridges (bumps) of stucco along the repair perimeter, that did not match the flat, smooth plane of the original stucco installation.



Grinding down the bumps to match the stucco plane. This involved some fill as well.



Repair scar eliminated.



Smooth stucco and poured in place cement walls showed minor staining from sprinklers and a few roof runoff areas, minor shrinkage cracks, and damage from landscaping equipment.



Accent planters, now looking a bit weathered to be removed and the stucco refinished.



After color-matched restoration work.



Minor staining of poured in place wall due to sprinklers.



After.



Example of minor voids and cracks located in various places.



Cracks and small voids filled to uniform finish.



Corner chipped by landscape equipment.



After.



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