

Installation Guide & Helpful Tips 2012

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NSVI highly recommends the installer read this document in its entirety before installing Natural THIN Stone Veneers. The information contained is provided to explain the most commonly asked questions about stone installation. The instructions, tips, and hints serve as general guidelines. NSVI has neither liability, nor can be held responsible, to any person or entity for any misunderstanding, misuses, or misapplication that would cause loss or damage of any kind. Review and adhere to local building codes, and follow safety guidelines. If questions arise, please attempt to contact your local dealer first. If the dealer cannot answer your question, call NSVI Technical Support: 920 . 251 . 2434



Getting Started

NSVI recommends having at least 5% - 10% additional material on-hand to ensure ideal color, size, and texture distribution. *

Material Calculations for FLATS

$$\text{Area}_{(\text{SqFt})} = \text{Length}_{(\text{ft})} \times \text{Height}_{(\text{ft})}$$

Subtract area covered by windows & doors.

Products in the **Ledgestone Collection** are packaged/marketed for tight-fit or dry-stacked applications, that is, no mortar joint. All other products are packaged assuming 1/2" mortar joint.

Material Calculations for CORNERS

Measure length or height_(ft) of corner to be covered with Natural THIN Stone Veneer.

One linear foot of corners will cover approximately 1/2 square foot of flats which can then be subtracted from the total square footage of flats calculated above.

For **Virginia** or **Silver Ledgestone** corners, measure linear footage and divide by two. Then see "Corners", Pg. 6. (Integrate 1—2 flats for every corner.) **Hudson & Diamond Ridge** Corners: 50% are ninety degree corners, and 50% are flats mitered at 45 degrees. **Bronze & Platinum** corners: 100% material are flats mitered at 45 degrees.

Environmental Considerations

In HOT, dry conditions, NSVI recommends to dampen the scratch coat or masonry substrate where the stone is about to be applied. Otherwise, the stone will absorb moisture from the mortar too quickly, resulting in a weaker bond. It should appear damp without any pooling.

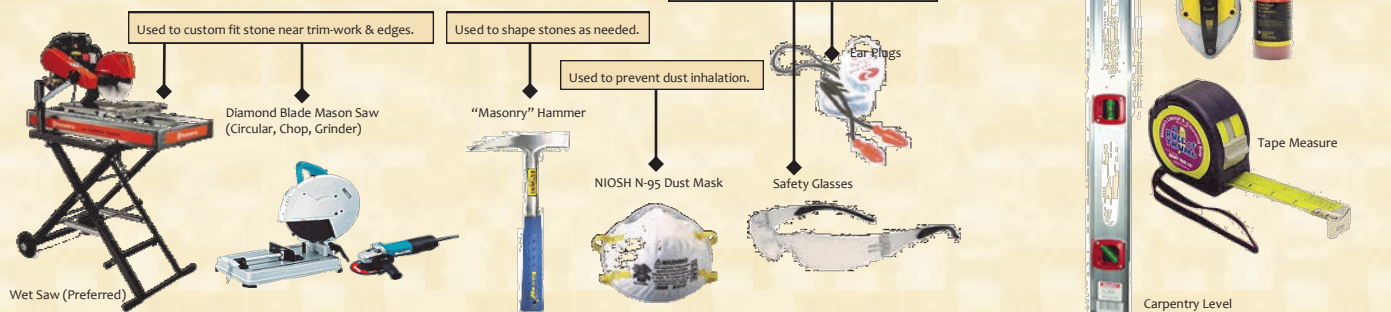
When air temperature falls below 50 degrees F (10 deg C), heat mortar mixing water. In temperatures less than 40 degrees F., mortar will not set properly. Keep the mortar and work area at or above 40 degrees.

Store mortar under cover in area where air temperature is maintained between 40 degrees F and 110 degrees F (4 degrees C and 43 degrees C).

(For minimum requirements, see: ACI 530.1/ASCE 6/TMS 602)

Tools & Equipment Needed

The tools shown may not all be required for every stone project. Also, NSVI does not necessarily recommend or endorse one brand over another.



Getting Started *(continued...)*

Preparation

Substrates

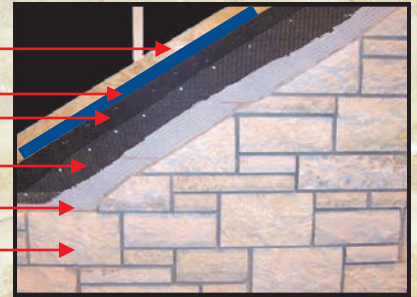
See page 4 for additional detail.

Wood Studs

* Rigid Backwall Sheathing

1/2" Rigid Backwall Sheathing *
Moisture Resistant Barriers (Exteriors)
(2 layers WRB: *House-wrap* & felt paper)

Wire Mesh
Scratch Coat



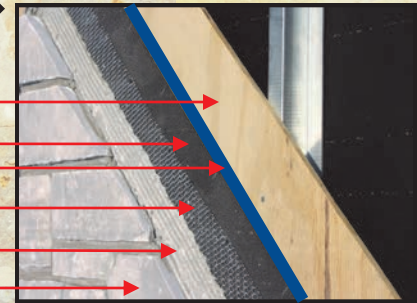
See page 4 for additional detail.

Metal Studs

* Rigid Backwall Sheathing

1/2" Rigid Backwall Sheathing *
Moisture Resistant Barriers (Exteriors)
(2 layers WRB: *House-wrap* & felt paper)

Wire Mesh
Scratch Coat



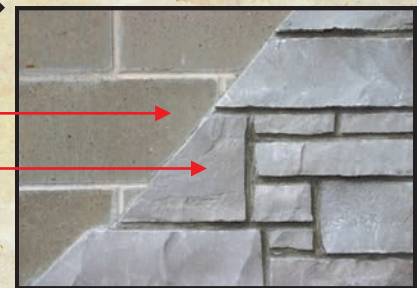
If CMU surface is untreated (virgin surface—no paint or other coatings), neither the wire lath nor scratch coat is required.

Ensure surface is clean and free of debris.

When necessary, dampen CMU surface before applying stone (see “Applying...”, Pg. 5).

Concrete Masonry Unit (CMU)

CMU Block



Best Practice: Use wire mesh & scratch coat as pictured (right).

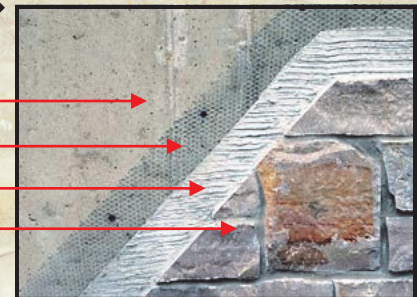
If paint or other protective coating is present, or if applying over Stucco, NSVI recommends the use of wire mesh.

Alternative: If concrete wall appears smooth, and clean, there could still be release agents present. Surface should then be sand-blasted or etched with muriatic acid and allowed to thoroughly dry.

Poured Concrete (& Stucco)

Poured Concrete (or Stucco)

Wire Mesh
Scratch Coat



Getting Started (continued...)

Preparation

Work Area

- Protect surfaces that could be damaged during the stone installation process, such as hardwood flooring, window trim, and other areas that have already been finished.
- Stage material close to the installation area. Layout stones so they can be easily viewed and reached. It is important to **obtain stones from multiple packages** (boxes and/or crates) and organize them by size, color, and texture. Opening all boxes and crates will facilitate random distribution.

Moisture Control (Flashing-WRBs-Weep screed)

- Verify flashing is properly installed (roof, chimney, windows, door openings, etc.)
- Flashing should integrate with Water Resistive Barriers (WRB), overlapping weep screed flange.*
- WRB: **2 layers**; house-wrap first, then felt paper.*

Install from bottom up, overlapping min. 4 inches, horizontally and vertically.

- Weep screeds may or may not be required.*

*** Refer to local building codes. ***

Wire Lath/Mesh

- Use expanded, galvanized, diamond-mesh meeting requirements of ASTM C847-06 (min 2.5 lb/yd²).
- Install tightly, cups up (smooth when felt from bottom to top, rough when felt top to bottom.)
- Overlap sections of lath approximately 1 inch.
- Fasten lath every 16" horizontally on-center, and maximum 6" vertically.
- Wrap corners minimum 16" (inside and outside corners.)

WOOD STUDS: If anchoring to wood studs with screws, use washers, and ensure 1 inch of stud penetration. If anchoring with wide-crown staples, ensure staples will penetrate 1 inch deep.

STEEL STUDS: If anchoring to steel studs, ensure 1/2 inch of steel penetration beyond inside surface.

Scratch-Coat

- Ensure surface is clean and free of any debris.
- Use Type-S mortar.
- It is important to **not** leave the scratch-coat surface smooth. Groove scratch-coat horizontally with a notched trowel.
- Scratch-coating can be done in its entirety before adhering stone, but it is also acceptable to "scratch-as-you-go".

Interiors (Over Drywall)

If drywall is used as the substrate, follow guidelines for *Wire Lath/Mesh* and *Scratch-Coat* as seen on this page. Then see, "Applying NSVI Stone Veneer" on page 5.

Interiors (Cement Board—Use for Interiors Only)

- Instead of using moisture resistant barrier and wire mesh system, cement board products can be used for interiors. (*Exception: Interior water features require MRB.*)
- Apply cement board, rough side out, over studs (drywall is not necessary, but can be left in place).
- Fasten cement board using corrosion resistant screws every 16" horizontally on center, and minimum 6" vertically, ensuring minimum 1 inch of stud penetration.
- Tape cement board seams with fiberglass tape and seal seams with Thinset mortar.
- Ensure surface is clean and free of debris.



Mortar

Type-S (ASTM C270) should be used for all NSVI stone products unless drystacking (i.e. *Ledgestone Collection*).

- Consistency of mortar mix is important. If too wet or too dry, mortar will not adhere to stone or substrate surface properly. It should stick to the trowel.
- NSVI recommends adding **acrylic bonding agent** to Type-S mortar. This enhances the flexural, adhesion, compressive, and tensile strength qualities.

Thinset (ANSI 118.4) when tight-fitting NSVI stone (also see Pg. 6).

- Use *medium-grade* ThinSet or
- Use *high-grade* ThinSet when adhering stone to water features or when installing in a high moisture environment (i.e. pool, shower, bath, spa).



Installation

Trimming & Cutting

Diamond Blade Wet (or dry) Saw

Some stones may require custom fitting. A diamond masonry blade saw is the preferred means for precision cutting. Wear proper safety gear.



Along with dry saws, 4 inch grinders with diamond blades can be used to trim stones as needed.

Masonry Hammer

Shaping and texturing edges for custom fitting stone is often done using a masonry hammer.

Care should be taken to ensure safety and minimal waste.



Applying NSVI Stone Veneer

- Begin installation at the bottom.
- It is helpful to install a temporary ledge to keep stone off of the floor (usually 1/2 inch above floor for interior walls), or 4 inches above grade for exteriors.¹ This will create a level starting point, and aid in speed of installation. Also, horizontal chalk-lines are beneficial every 12"- 16" for the same reason.
- Install some corner stones before flats.²
- Spread approximately 1/2 inch of mortar to entire back of stone (leave no air pockets).
- With firm pressure, press stone into place with a slight wiggle, allowing mortar to ooze around the outer edges of the stone. Take care to prevent mortar from getting on surface of stone. (See *Care, Cleaning, & Maint.* this page.)
- Hold in place for a few seconds or until stone feels relatively secure in its wet mortar bed.
- Small stone chips or wood wedges can aid in immobilizing stones. (Removed before filling joints.)
- Remove excess mortar from around stone using trowel or tuck pointer.
- Once placed—**Do Not Disturb**. If stone loosens, it must be removed. Mortar must be completely cleaned off of the stone **and** the area where the stone was located. Then, reinstall stone per steps above.

¹ See Pg. 7 "Grade Level Finishing".

² See Pg. 7 "Stone Patterns".

Filling & Finishing Joints

Two Methods for Filling Joints—

- **Fill-As-You-Go** *
Mortar is applied to top of previously placed stone ("bed-joint"), and to adjacent stones ("head joint") then a new stone is placed on top of (or next to) the mortar joint bed, and tuck-pointed into remaining joints around the stone, sealing it to substrate.
- **Grout Bag** (a.k.a. "cake-bag") *
Injecting mortar into joints after stone has been installed.

* If used, remove stone chips and/or wood - wedges prior to filling in joints.



Finishing—

When mortar joints become firm, or thumbprint hard, the finishing process can begin. Temperature and relative-humidity will affect the time it takes the mortar to get thumbprint-hard.

Mortar joints are typically raked back and brushed smooth dependent on the joint style specified:

Overgrout— Mortar joints are filled in, flush to the surface of adjacent stone(s), then smoothed with a soft bristle brush.

Standard— Mortar joints are raked back to reveal the edge of the stones, then swept smooth with the brush. Joints should **not** be raked too deep as this could impact the integrity of the installation.

Key: Do Not Give Reason for Water To Get Behind Stone.



Care, Cleaning & Maintenance

If mortar gets on the face of the stone, let it dry slightly, brush off, and then sponge off any residue left behind. The best cleaning method for natural stone is a diluted, mild, detergent, 2—3 days after stone is set. Try an inconspicuous test area before attempting to clean an entire stone surface.

Do Not Use Metal Brushes or Acids!

Application Tips

Arches

With or Without Corners

- For a full-veneer look, use corners as shown in the photo (right).
- For a more uniform appearance, a *soldiers-course* can be installed using only flats as shown (below).
- Bracing is generally not required, but mortar consistency is important.



Columns

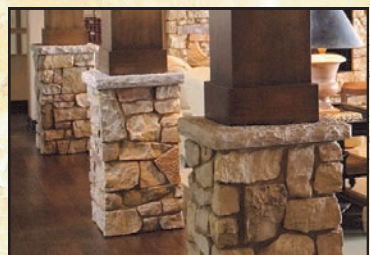
CMU or Wood Substrates are Typical

CMU — (Preferred)

- Begin with corners, staggering the lengths.
- Follow instructions for CMU on Pg. 3.

Wood Substrate —

- Column should be of sturdy, sound construction, and internally braced to prevent twisting and to minimize movement.
- Columns should be designed so that stone does not bear the load of other structural or aesthetic elements.
- Apply weather resistant barrier as needed (see Pg. 4)
- Wire lath must be wrapped 16 inches min. around the corners.
- Lath should wrap around and meet at or near center of one of the column sides, overlapping by at least 1 inch.
- Follow remaining procedures on Pages 4 and 5.



If capping top of exterior column(s), caps should extend 1—2 inches beyond the surface of the installed stone to help facilitate water run-off.

Corners (Outside, 90 Degree Only)

- Start at the bottom.
- Stagger leg lengths.
- Maintain level leg and returns, excluding irregular stone (i.e. fieldstone & mosaic).

Virginia & Silver LedgeStone

- For every corner, integrate 2—3 flats above it to avoid a vertical jagged line.

All downloadable **Corner Installation** guides:

http://www.nsvi.com/installation_instructions.html

Drystacking (TIGHT-Fit joints)

- LedgeStone is typically installed with *tight-fit* joints. (All NSVI products can be done similarly.)
- NSVI recommends *ThinSet* for all tight-fit applications. (Not truly mortar-less. See Pg. 4 “Mortar”).
- Cured Thinset mortar color is usually white or gray, however, a color additive can be mixed in with *gray* ThinSet to better compliment the natural stone hues. Follow instructions on manufacturer’s label to ensure proper and consistent proportions.



Fireplaces

Make Over: Installing Stone Over Existing Brick



Brick surface texture and coatings (if present) must be evaluated to determine if wire mesh and scratch coat is needed. If too smooth or painted, wire mesh and scratch coat is required. If surface is porous, unpainted, and mortar joints are in good shape, clean surface, ensure it is debris free, then butter back of stone, and firmly press stone into place.



Wire Mesh applied over drywall.



Scratch-coat of mortar applied.



Keeping stones level.



Finished project.

Hearths



Building a new hearth out of plywood, followed by wire mesh, anchoring to floor, scratchcoat, then stone.

Application Tips *(continued)*

Flashings

Consult your local building codes, and review NSVI drawings at the following link:
http://nsvi.com/architectural_specs.iml

Floors, Walks, & Patios

Natural Thin Stone veneers can be installed over untreated concrete walks and other substrates. NSVI recommends travertine stone tiles for horizontal surfaces, but high density sandstone or limestone flats can also be used. **Prevent tripping hazards** by selectively choosing flats with consistent depth and surface texture before installation, and consider full mortar joints (overgrout). **Surface options:**

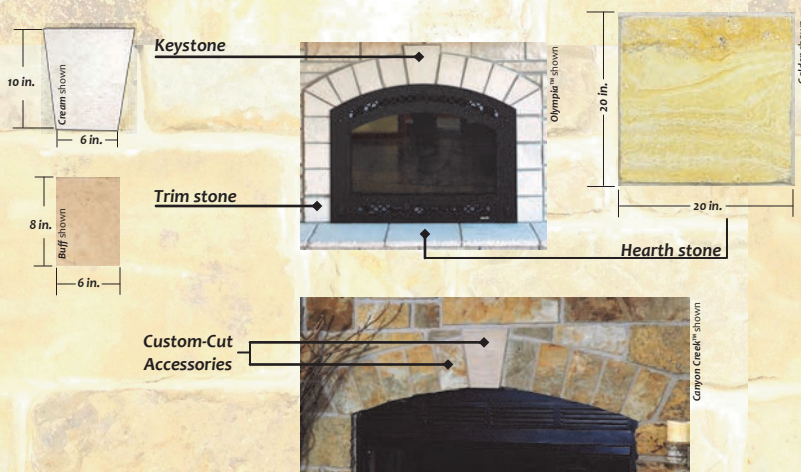
- Interiors— Over Concrete
Over Wood Subfloor
- Exteriors— Over Concrete
Over Decking (Additional consideration to deck design may be required.)

Grade Level Finishing

- Over Concrete—Stone is to remain 2" above (i.e. garage front).
- Ground Level—Stone is to remain 4" above.

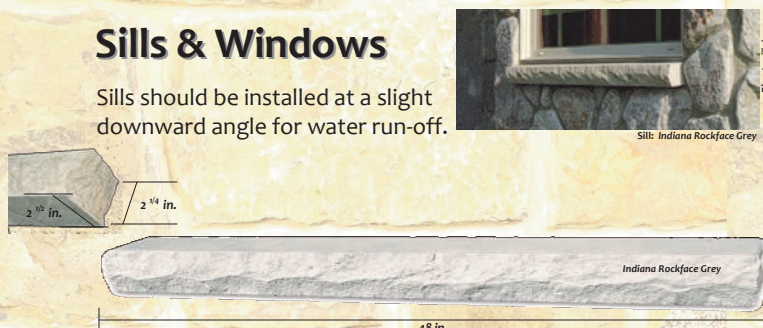
Hearth, Trim, & Keystones

NSVI accessory stones have the dimensions shown below, or can be custom-cut onsite using the same stone type as the project:



Sills & Windows

Sills should be installed at a slight downward angle for water run-off.



Stone Patterns ... With or Without Corners:

NSVI recommends the following patterns & layouts. Please view NSVI website photo slideshows in each Collection for representative installations.

Note that it is not necessary to strictly follow these recommended configurations:

Dimensional— 2:1 pattern, specified heights

NSVI Collection:
Dimensional



Dimensional LedgeStone— Tight-fit, 1:1 pattern

NSVI Collection:
LedgeStone



Random Ashlar— Combination 1:1 & 2:1 pattern

NSVI Collections:
Biltmore
Traditional
Tuscan



LedgeStone— Typically tight-fit, 1:1 pattern

NSVI Collection:
LedgeStone



Mosaic— Irregular, randomly sized material

NSVI Collections:
Fieldstone
Mosaic
Old World



Travertine: Specified sizes & layout (see link below)

NSVI Collection:
Stone Jewel



Pre-cut & packaged in
Roman Pattern:
See: www.nsvi.com/Jewel_Specification_Sheet.pdf

Natural stone veneers® INTERNATIONAL INC

Codes & Standards

ASTM

- C 847 Metal Lath
- C 270 Mortar for Unit Masonry

ACI 530.1-05/ASCE 6-05/TMS 402-05, 602-05
Building Code Requirements
for Masonry Structures

ANSI 118.4 Thinset (medium grade)



CONTACT INFORMATION

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Warranty

Natural Stone Veneers International, Inc.—Limited Warranty

Subject to these terms and conditions, Natural Stone Veneers International, Inc. ("NSVI") warrants its products for a period of fifty (50) years from the date of original purchase from NSVI against manufacturing defects when used on a structure which conforms to all building codes and regulations and when installed in accordance with NSVI's instruction, specifications and guidelines. In the event of a defect, NSVI will credit the cost of the products purchased or, at NSVI's option, repair or provide new products to replace any products determined to be defective. This warranty is limited to the original purchaser and may not be transferred to any subsequent owner. This limited warranty does not cover damage from: a) settlement of the building or improvement or other structural movements; b) contact with chemicals or paint; c) deterioration or discoloration due to airborne contaminants; or d) staining or oxidation. This limited warranty covers only manufacturing defects in NSVI products. NSVI is not responsible for labor costs in removal and replacement of defective products.

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See installation videos: http://nsvi.com/installation_instructions.html